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Contemporary Issues in Sustainable Finance

Exploring Performance, Impact Measurement and Financial Inclusion

Edited by
Mario La Torre · Sabrina Leo

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Palgrave Studies in Impact Finance

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About This Book

This book addresses three crucial perspectives of sustainable finance: measurement, performance, and financial inclusion, looking at the theoretical and empirical relationship between business models and non-financial effects, mainly environmental and social.

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CHAPTER 1

Introduction

Mario La Torre and Sabrina Leo

The economy, and the financial system, are at risk due to the increasingly frequent and extensive harm caused by climate and social changes. Environmental, social, and governance (ESG) concerns, which include threats to biodiversity, social conditions, and business management standards, impact the economy's present and potential growth (Bank of Italy, 2022). Environmental and sustainability characteristics are among the most relevant risk categories, in terms of both the frequency and severity of potential repercussions (World Economic Forum, 2022). Investor attention to ESG concerns has grown globally. Approximately 36% of the world's assets under management, or $35.3 trillion, were sustainable financial investments; this was more than double the amount in 2016 (Global Sustainable Investment Alliance, 2021). The economy's sustainable growth, and the financial system's stability, can be impacted by these factors, as well as the social and governance profiles of businesses and institutions.

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Businesses and the financial industry are becoming increasingly interested in sustainability. Contemporary environmental and social issues are challenging the traditional business paradigm, which needs to be more open and inclusive to meet the interests of new stakeholder groups better.

At the European level, it was reiterated how sustainability, even considering the recovery following the COVID-19 pandemic, will play a critically important role in achieving the goals of the European Green Deal.

From those mentioned above, it follows that both measuring impact and performance are crucial, as well as communicating results to stakeholders.

Despite the attention that sustainable finance is receiving, even considering recent global events, several issues still need attention.

This book aims to maintain awareness of the problems with effect measurement, generated performance, and, not least, the function of sustainable finance in financial Inclusion.

The book is divided into three sections in this way.

The first devoted to Measurement is addressed in Chapters 2, 3 and 4. *Chapter 2, How to Scale Impact Investments? Evaluating the Application of the Synthetic Control Method in Impact measurement—by Sina Sauer, Rahel Becker, and Volker Then*—debates on the issue that impact measurement is under more pressure than ever, as impact investments move from a specialised market to the broader financial sector. Impact investors increasingly strive to rate huge portfolios of businesses based on thorough impact considerations, rather than evaluating individual interventions. To enable a large-scale quantitative and data-based impact assessment, impact measurement must be scaled. Therefore, by assessing the requirements for its implementation, and analysing potential applications to a vast universe of enterprises and a wide variety of asset classes, this chapter brings the synthetic control method into the field of impact investing. This strategy may be the first step in creating a measurement framework for a sizable impact investing market that can be used in research and practice.

Chapter 3, Impact Investments Measurement: Bridging Research and Practice—by Eugenia Strano Alessandro Rizzello, Annarita Trotta—considers that impact investing can be distinguished from other types of investing by its intentionality and quantifiable impact. Impact measurement, which applies to all impact stakeholders—including impact investors and intermediaries, investees and social enterprises, public administrations, and governments—has emerged over the past ten years as

a common technique for assessing the financial and social return produced by impact investments. To improve impact measurement's reliability, efficiency, and applicability, this study was conducted to examine some practices empirically. The authors examined two measurement tools—SROI and BSC—using a qualitative methodology based on a case study analysis.

Finally, *Chapter 4, ESG Ratings, Scores, and Opinions. The State of the Art in Literature—by Mario La Torre, Mavie Cardi, Sabrina Leo, and Jacopo Schettini Gherardini*—focuses on the current state of the scientific literature on ESG evaluations, scores, and opinions using both bibliometric and systematic reviews of the literature. The prevailing literature, according to the initial hypothesis, tends to concentrate on few perspectives, while leaving other areas of investigation unexplored; for example, it does not take into account the proper distinctions between methodologies and definitions when considering ESG ratings and scorings, as well as it concentrates less on the specific ramifications of the ESG topic for banks and financial intermediaries.

The second part of the book (Chapters 5, 6, 7, and 8) which is devoted to Performance, opens with *Chapter 5, Corporate Financial Performance and ESG Performance: Which One Leads European Banks?—by Mario La Torre, Sabrina Leo, and Ida Claudia Panetta*. This chapter explores the connection between a bank's ESG performance (ESGP) and corporate financial performance (CFP). Here, the relationship between ESG elements and financial benchmarks is examined to see if banks could find enough impetus (greater CFP) in the market response to adopt ESG behaviour on their own. The chapter extends the link between ESGP and CFP to all accessible listed European banks between 2008 and 2020 based on the findings of a prior pilot study (La Torre et al., 2021), which focused on a small number of European listed banks. The authors examine the relationship between ESGP and CFP using panel estimate techniques, taking multiple aspects of financial performance into account.

Chapter 6, Is Performance the Key Issue in SRI Funds? Conclusion and Lessons Learned from Three Decades of Studies—by Susana Martínez Meyers, Maria Jesús Muñoz Torres, Idoya Ferrero Ferrero—conduct a thorough analysis of the key studies that compare the SRI Equity investment funds' performance to that of their conventional rivals. Depending on the benchmark employed, an analysis of the current literature is conducted and divided into two samples. The analysis of the years 1992 through July 2021 yields a total sample of 54 publications. Authors concludes

that the vast majority (67%) of empirical research does not find a difference in the relative financial Performance of SRI funds, or a difference that is not statistically significant. Authors examine scholarly trends and proposed "best practices" (sample size, period of the analysis, and use of multifactor measures).

Chapter 7, The Financial Side of the Social Impact Bond: The Determinants of the Returns—by Rachele Hyerace, Maria Mazzuca, Sabrina Ruberto—investigates the variables that affect a SIB's financial return through a financial viewpoint. The premise of the empirical strategy is that the investor appeal of SIBs, which in turn typically depends on the (financial) return, affects their diffusion. However, SIBs are particularly unique programmes that allow for the use of structured finance to achieve social goals. Therefore, it is conceivable that their financial return and a social return are combined. In order to understand the appeal and function of the (conventional) finance in these (social finance) schemes, it becomes interesting to look into the factors that determine the financial return. Using an original dataset and a sizable sample of 181 SIBs during 2010, the authors provide an empirical analysis.

The last part of this section *Chapter 8, Catastrophe Bonds: A Mitigation Opportunity in Turmoil Period—by Mariani Massimo, Caragnano Alessandra, D'Ercole Francesco, Didonato Raffaele, Frascati Domenico*—attempts to investigate the favourable effects of a minor to no correlation between traditional assets, such as bonds, equity, real estate, and commodities, and alternative asset classes such as catastrophe bonds. The diversification impact of catastrophe bonds has been examined through spanning tests and portfolio optimizations using a multi-level methodology based on linear correlation and regression, leading to the designation of the instruments as market-uncorrelated diversifiers. The chapter demonstrates the increased resilience of the catastrophe bonds suggesting its inclusion in diversification portfolios during turbulent periods, assuming the durability of the results during pandemic crises, as a prospective market breakthrough.

The third part of the book (Chapters 9 and 10) is devoted to Financial Inclusion. *Chapter 9, Collaboration or Community? The Impact of the Institutional Forces in Promoting Social Crowdfunding—by Minguzzi Antonio, Modina Michele, Filomeni Stefano, Bredice Marilena*—focuses on the function of an Italian platform to investigate if social crowdfunding causes the success of social projects. The study investigates how the platform functions in fostering communication between non-profit

organisations and private investors eager to engage in the financing of social initiatives, by looking at 140 projects between 2016 and 2018. The findings confirm the important impact social crowdfunding platforms have on a campaign's success. The likelihood that the financing goals will be met is increased by the population's involvement in projects that capitalise on human connections and social dynamics.

Chapter 10, Financial Inclusion and the Gender Gap across Islamic and non-Islamic Countries—by Latifah A.O. Baeshen, Claudia Girardone, Anna Sarkisyan—using the Global Findex database of the World Bank, carries out an exploratory analysis of the gender gap and patterns of financial inclusion among 56 Islamic and 101 non-Islamic nations, from 2011 to 2017. The authors demonstrate that, although financial inclusion is still comparatively low in the sample, it is particularly difficult for women and those living in Islamic countries. The finding provides evidence that among the potential factors of financial exclusion in Islamic countries, as contrasted to their non-Islamic counterparts, are the strength of the economy, the social and institutional environment, as well as banking market conditions and technology.

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PART I

Measurement

CHAPTER 2

How to Scale Impact Measurement? Evaluating the Application of the Synthetic Control Method in Impact Measurement

Sina Sauer, Rahel Becker, and Volker Then

Introduction

In the last decade, sustainable and impact investments built a rapidly growing and developing part of the financial market. According to the Global Impact Investor Network (GIIN), the current impact investing

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market size can be estimated at USD 715 billion (Hand et al., 2020). Thereby, impact investments are defined as "investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return" (Global Impact Investing Network, 2021a). More details on the definition of impact investing will follow in the section 'Defining Impact Investing'. Sustainable investments is used as a broader umbrella term for all investments considering any kind of environmental, social or governance (ESG) criteria (Busch et al., 2021).

In the context of its rapid growth, also the characteristics of the sustainable investment market and its investments are changing. In the literature, three development phases of the market are distinguished (Busch et al., 2021): First, exclusion criteria were incorporated in investment decisions to avoid investments in companies that are conducting socially or ecologically harmful business practices. In the second phase, environmental, social and governance-oriented (ESG) criteria were implemented in company performance evaluation. The leading thought behind is risk avoidance: every investment not only bears financial, but also social and economic risks, and, hence, considering ESG criteria in the investment decision mitigates the probability of such risks. In the third and current phase, investors increasingly pay attention to the real-world impact of sustainable investments, pursuing social goals and aiming at changing company practices (for the definition of impact, see section 'Defining Impact Investing').

From 2007 on, the impact investing market started to commercialize, and more and more "mainstream players" such as big commercial banks entered the market (Reisman et al., 2018). On the one hand, this may be explained by expectations of prospective profits, since research shows that investors have a significant willingness to pay for sustainable investments (Bauer et al., 2021; Heeb et al., 2022). On the other hand, it is driven by regulatory pressure, like the taxonomy for sustainable activities of the European Union[1] As a side effect, this development increases the incentives for whitewashing, i.e. labelling products as sustainable without having a measurable impact (Findlay & Moran, 2018). To tackle this problem and ensure the creation of real and measurable impact, impact measurement methods correspondingly gain importance.

[1] For more information, see: https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en.

So far, most impact measurement approaches are built in the context of small-scale social enterprises or company internal evaluation of single interventions (compare section 'Development of Impact Measurement Methods'). Due to the increasing awareness of impact in the financial market, investors also seek to determine the impact of big-scale investments and large investment portfolios, but existing approaches are hardly applicable in this regard. Therefore, it is necessary to create new impact measurement approaches that are data-based and applicable to a large universe of companies. However, impact data cannot be evaluated in isolation from its regional, sectional or corporate context, but rather need to be integrated into a qualitative impact model (as described below).

This chapter aims to pick up this question and examine the requirements and properties of impact measurement in light of the expanding impact investing market. Based on our observations we propose the application of the synthetic control method developed by Abadie and Gardeazabal (2003) and discuss its advantages and weaknesses within the impact measurement context. The synthetic control method was chosen since it fulfills two important requirements that need to be balanced: (1) it is simple enough to explain its results in a transparent way to the general public, but (2) it provides ways to also add complexity when needed. Thereby, we contribute to the growing impact investing and impact management literature and introduce a quantitative, data-based method that might be applied in practice as well as research. It represents one example of how impact measurement can be operationalized to solve the real-world challenge: How do we measure the social impact of assets to deem them eligible for sustainable investments?

The rest of this chapter is organized as follows: In the section 'Defining Impact Investing' the terms impact and impact investing are defined. The section 'Development of Impact Measurement Methods' gives an overview of existing impact measurement frameworks, followed by the section 'Context and Objectives' which provides more details on the context and objectives of our impact measurement approach. In the section 'Synthetic Control Method', the synthetic control method is presented and its possible application in the context of impact measurement is illustrated in the section 'Application'. The last sections provide a discussion of the method and a conclusion.

Defining Impact Investing

Talking about impact measurement, first of all, the term "impact" needs to be defined. So far, the literature offers still no universal definition of impact and impact investing (Maas & Liket, 2011). This section intends to develop a common understanding of the terms; however, it is important to note that the impact measurement method as proposed below may be applied in various contexts and can be based on slightly different definitions as well.

Within the field of project evaluation, the concept of impact value chains has been established to determine the effects—or impact—of an intervention (Clark et al., 2004). Following Then et al. (2017), an impact value chain is conceptualized as a sequence of five elements: input, output, outcome, deadweight and impact, as shown in Fig. 2.1.

As described by standard economic theory, every organization—companies as well as NGOs—use inputs like capital or human resources to create outputs. The term output in this case includes any activity executed by an organization, ranging from production or service provision to governance decisions. Any of those activities affect the stakeholders of the acting organization, e.g. clients, customers or employees. For example, the activity conducted may affect the awareness or knowledge of stakeholders, leading to a change in their behaviour and maybe even altering their circumstances. Those effects are summarized by the term outcome. Outcomes can be intended and unintended, following immediately or in the long term, and can include a variety of dimensions, like economic, social, cultural, etc.

In the simple case of a single intervention, outcomes are often measured by observing the situation of all relevant stakeholders before the activity and after the intervention (Then et al., 2017). Comparing the situation before and after the activity, all changes in the circumstances of the stakeholders represent the outcomes. However, this raises the question of causality: In the real world, neither any organization nor its

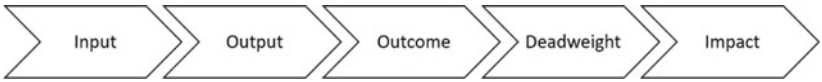

Fig. 2.1 Impact value chain (Adapted from Then et al. [2017])

stakeholders act isolated, but rather as a part of a complex social structure. Therefore, it can be assumed that changes in their environment are caused by various factors in parallel and, thus, some of the observed changes in circumstances would have occurred anyway, even without the observed activity of a particular organization (Then et al., 2017). For example, assume that an organization organizes a campaign to raise awareness of the negative environmental consequences of plastic waste. Comparing the amount of plastic waste found in the region one month before the start and after the end of the campaign, a significant decrease in plastic waste is observed and could be perceived as a direct effect of the campaign. However, this decrease might be caused or influenced as well by other events and parties, which are independent of the observed activity. For example, maybe the local fast-food store had to close for renovation or a new tax on plastic products, passed by the government a few months before, entered into force. It is reasonable to assume that such events significantly contribute to a lower use of plastic, maybe even more than a small awareness campaign, and therefore should be taken into account.

Thus, we follow the impact definition by Clark et al. (2004), defining impact as "the portion of the total outcome that happened as a result of the activity of the venture, above and beyond what would have happened anyway" (Clark et al., 2004, p. 7). The part of the outcome that cannot be attributed to the observed activity is called deadweight and summarizes all other influencing factors that may exist (Then et al., 2017). Consequently, the impact which can be attributed to a particular organization and its activities can be calculated as total (gross) outcome minus deadweight. In the rest of this chapter, the term impact is used following this definition.

As mentioned above, within the financial market the field of impact investing is growing significantly. According to the GIIN, impact investments are defined as "investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return" (Global Impact Investing Network, 2021a). Although there exists again no universally applied definition, three basic definition criteria have emerged over time: intentionality, measurability and additionality (Brest & Born, 2013):

Intentionality: Generally, impact investments aim "to solve problems and address opportunities" and thus seek to "contribute to measurable social or environmental benefits" (Global Impact Investing Network, 2021b). This intention clearly distinguishes impact investments from other sustainable investment forms focused on minimizing environmental

risks as most ESG approaches. However, intentions are not observable; one might draw conclusions from the decision-making of a subject or organization, but references to intentionality can only be speculative (Busch et al., 2021).

On the other hand, one might also argue by observing the strategic investment behaviour and impact orientation: If investors spend effort and resources on impact management, implementing a corresponding tool and incorporating the results in their decisions, it reflects their interest in creating impact, likely (even though not necessarily) due to their impact-generating intention. Hence, incorporating strategic impact management tools could be seen at least as a rough proxy for intentionality.

Measurability: For investments to be considered as impact investing, it is required by definition that generated social or environmental benefits are measurable (Global Impact Investing Network, 2021b). The approach presented in this paper intends to strengthen measurability by building upon available data and implementing statistical measures for evaluation.

Additionality: The last and maybe most controversial point is the assumption of additionality: impact investment leads to positive social outcomes that would not occur without this particular investment (Brest & Born, 2013). This implies that the impact investment capital allows the investment enterprise to increase either the quantity or the quality of their outcomes compared to what would have occurred otherwise without this particular investment (Brest & Born, 2013). This can be realized by offering additional capital to companies or capital at below-market rates in the context of impact investing (Barber et al., 2021).

Considering social enterprises and start-ups, this argument is reasonable. Socially oriented start-ups, placing impact goals before profit and maybe acting in niche markets, may struggle to find investors. Depending on the business model and the activities of a social enterprise, they might not be able to become self-sustainable and offer returns to its investors (Gianoncelli & Boiardi, 2018). Not valuing the social impact, purely profit-oriented investors will not consider those companies. Therefore, investment offers are scarce, and additionality can be generated straight-forward by offering capital to socially oriented enterprises.

However, considering stock market-listed companies, this argument fails. Following standard portfolio theory, the investor demand in stock markets is perfectly elastic: If one investor does not buy a stock, another

will. Hence, single assets in stock markets can be seen as perfect substitutes (Loderer et al., 1991). Therefore, in this context, the concept of additionality as described above is not applicable: If the stocks of a firm will be bought anyway, a single investor cannot provide additional capital to a company through her investment decision.

The response to this conflict is twofold: Some researchers conclude that impact investing by definition excludes public equity investments and is therefore restricted to certain asset classes (Wilkens & Klein, 2021), while others promote expanding the definition of impact investing beyond providing additional capital (Busch et al., 2021). Further mechanisms for investors to generate impact include investing only in firms that actively contribute to impact goals (so-called impact-aligned investments) or influence firm decisions towards more sustainability by voting and engagement (impact-generating investments) (Busch et al., 2021). However, the empirical evidence is ambiguous so far. While some studies find evidence for a capital market effect of divestment of non-impact firms (Rohleder et al., 2022), others do not confirm the same (Berk & van Binsbergen, 2021). Besides the divestment effect, according to Peters (2022), impact-aligned investments may also have a signal effect on the capital market, since such investments, especially by large institutional investors, increase the visibility of the investee companies and may encourage more investors to do the same (Peters, 2022). Furthermore, it signals to the companies that not only financial success matter to investors, but also their business practices. However, the evidence on the signaling effect is ambiguous as well (Kölbel et al., 2020).

To sum up, the empirical evidence on impact mechanism is contradictory so far. Therefore, we will follow again the GIIN which states that impact investments can be made in any asset class, including public equity (Global Impact Investing Network, 2021a). It needs to be noted that the mechanisms described before all refer to investor impact, defined as "the change that investor activities achieve in company impact" (Kölbel et al., 2020, p. 555), which should be distinguished from the investee impact, i.e. the impact (as defined before) of the invested enterprise. Impact(-aligned) investments clearly require assessing the enterprise impact of (prospective) investee companies, but so far, a corresponding impact measurement tool is missing.

Development of Impact Measurement Methods

As stated by a recent OECD report, the current landscape of impact measurement methodologies appears to be fragmented and confusing (OECD, 2021). Going back, before impact measurement started to gain attraction in the financial markets, it originated as an instrument of public policy to assess public or private interventions and developed into the research field of program evaluation, applied e.g. in development economics or public policy (Pimenta & De Morais Sarmento, 2021). Over the last decades, social impact measurement developed into a separate discipline and has increasingly gained the interest of the private sector (Reisman et al., 2015). This led to the development of a wide range of new, market-oriented standards, resulting in today's broad and heterogeneous field of measurement methods (OECD, 2021, for an overview, see Maas & Liket, 2011). This fragmentation is caused by different reasons, like differing needs and characteristics of socially oriented organizations as well as high transaction costs and inefficiencies related to the use of international standards (OECD, 2021). According to Reisman & Olazabal (2016), the resulting approaches can be categorized into four broad categories:

- Market Systems Analysis (measuring the systemic impact)
- Performance Monitoring (regular data collection to track progress and evaluate the performance of investments)
- Rigorous Outcome and Impact Measurement
- Standards

Corresponding examples are provided in Table 2.1.

It should be noted that the terms impact measurement frameworks, approaches, and methods are often used synonymously but may refer to quite different concepts (OECD, 2021). For clarification, in the following, the OECD definition will be adopted, which defines the term approach as the overarching concept that is composed of indicators, tools, methods and frameworks (OECD, 2021).

Impact reporting standards provide structures and standardized performance metrics to guide impact communication and reporting, including rating systems as well as negative and positive screenings (Reisman & Olazabal, 2016). They can be applied by impact investors and investees

Table 2.1 Categories and examples of impact measurement approaches

Category (Reisman & Olazabal, 2016)	*Examples*
Standards	IRIS + , GRI, SASB
Rigorous Outcome and Impact Measurement	Impact Measurement Project (IMP)
Market System Analysis	International Finance Corporation: Anticipated Impact Measurement and Monitoring (AIMM)
Performance Monitoring	KPMG True Value, BCG Total Societal Impact

and may be included in different frameworks and normative frames, such as the Sustainable Development Goals (SDGs). Examples of impact reporting standards are given, among others, by IRIS + , GRI and SASB [for an overview, see Pimenta & De Morais Sarmento, 2021].

The category of outcome and impact measurement includes a wide range of approaches (Maas & Liket, 2011; Reisman & Olazabal, 2021). An example of an internationally established and applied impact measurement approach is given by the Impact Measurement Project (IMP), which identifies five dimensions of impact: Generated outcomes, tangent stakeholder, scale/debt and duration of the outcomes, incorporated risk and degree of enterprise contribution to the occurred outcomes (Impact Management Project, 2018). While intended to guide a comprehensive impact evaluation, it does not specify indicators or scoring methods. Thus, to be usable in impact investing, organizations need to determine the corresponding tools and methods to implement it.

Observing approaches that are in use in the market, it should be distinguished precisely between ESG- and impact-oriented frameworks (Reisman & Olazabal, 2021). In contrast to ESG approaches, an impact measurement framework should be based on an impact thesis and leans on impact evidence (Pimenta & De Morais Sarmento, 2021). The latter implies that the focus should be set on observing outcome and impact data rather than output data. Taking a closer look at current impact-labelled stock market ratings and evaluations, e.g. by commercial data providers like MSCI or Sustainalytics, those criteria are not satisfied. Their ratings offer a wide range of indicators and corresponding enterprise-level data, often industry-specific and qualitative as well as quantitative. In many cases, output indicators are provided; more sophisticated impact data providers like Scope include outcome indicators as well as the supply

chain of a company. However, those approaches are not built on an impact thesis nor do they have a normative basis. The process of selecting indicators and weighting is mostly non-transparent and especially so-called SDG scores are usually based on a single argument like sales in a certain SDG-related industry. Thus, according to the criteria stated above, we do not consider them as impact frameworks but classify them as (broader) ESG approaches.

Within a market system analysis, not only the effects on the stakeholders of an organization are measured, but also its systemic impact (Reisman & Olazabal, 2016). An example is the Anticipated Impact Measurement and Monitoring System (AIMM) by the International Finance Corporation (IFC). It assesses two dimensions of impact, project outcomes and market outcomes. Project outcomes "refer to a project's direct effects on stakeholders; the direct, indirect and induced effects on the economy and society overall; and the effects on the environment", while the latter evaluates "a project's ability to catalyze systemic changes in markets that go beyond those direct effects brought about by the project itself" (International Finance Corporation, 2017, p. 5). The framework is designed to ex-ante examine project effects and results in an impact potential score, providing both benchmarks and measurement indicators. However, since it strongly focuses on the assessment of a single project or activity, implying a large scope and many required inputs, it is not feasible to apply the framework to an entire company or even a portfolio.

The last category comprehends performance monitoring approaches that aim at collecting data to track progress and evaluate the impact performance of investments (Reisman & Olazabal, 2016). In the market, various frameworks offered by commercial enterprises can be found, such as KPMG True value[2] or Total Societal Impact by BCG[3]. Since the methods and calculations behind these approaches are only partially accessible, a comprehensive evaluation is impeded (Coulson, 2016). So far, a transparent and strictly impact-focused performance monitoring system is still missing.

[2] See: https://home.kpmg/xx/en/home/services/advisory/risk-consulting/internal-audit-risk/sustainability-services/kpmg-true-value-services.html.

[3] See: https://www.bcg.com/publications/2017/total-societal-impact-new-lens-strategy.

Summing up, there already exists a broad range of impact measurement concepts and frameworks. However, while most applied frameworks are ESG-focused, impact concepts are primarily dedicated to the evaluation of single projects and enterprises and, thus, are not suitable for investors to evaluate the impact of (potential) enterprises to invest in for an entire portfolio. At this point, we want to tie in and enable a data-based impact measurement by incorporating statistical methods in impact measurement. After narrowing down the context and objectives, the section 'Synthetic Control Method' will then present the method.

Context and Objectives

As outlined above, the impact investing market is currently converging towards the mainstream financial market and the demand for impact investments rises (Hand et al., 2020). To be able to steer their investment decisions based on impact considerations, investors seek to determine the impact of their (prospective) investment assets, i.e. measure the enterprise impact complementary to their investor impact. Thus, investors, portfolio managers and researchers face the problem of how to measure the impact of entire companies and large investment portfolios rather than single interventions. Evaluating a large number of companies by means of their impact (comprehensively) implies the need of processing a large data volume and, hence, requires the application of a statistical approach that enables automatic processing and quantitative data evaluation.

Considering a single intervention, this might be implemented by observing a (natural) control group or conducting a quasi-experiment, e.g. by a time series analysis or the Neyman–Rubin causal model (Gertler et al., 2016). However, often it will not be feasible to collect baseline data (Bamberger, 2010) or, especially while facing a large number of enterprises, applying those methods would be time-consuming and very costly. Therefore, we propose the application of the synthetic control method by Abadie and Gardeazabal (2003). In the context of an impact value chain, the synthetic control method can be used to approximate the deadweight. But of course, the proposed methodology may be applied to other impact concepts as well and hence complements existing impact measurement concepts and frameworks.

Applying this statistical method to the field of impact measurement, we intend to balance the different trade-offs that an impact measurement framework faces: First, it must be general enough to be able to

rate a wide range of assets and asset classes[4]. As outlined above, various measurement approaches are already available throughout practice and academia, but often they are limited to specific subgroups of the asset universe. For example, the methodology proposed by the Impact Weighted Accounts Initiative[5], calculating the product impact, does not apply to service providers or real estate investments. But since impact investments can refer to different asset classes, including real estate or state bonds, universal impact measurement approaches should be able to rate them as well.

Second, an impact measurement framework should be applicable for different kinds of investors, large institutional asset managers as well as private investors. Therefore, a measurement framework has to be understandable and communicable not only to field experts but also to the general public to allow for impact-based investment decisions. Transparency and traceability need to put investors and financial intermediaries into an informed position without overwhelming them.

Third, to be practicable and reduce effort, the approach needs to rely on available data to be able to do the first steps in the direction of a social impact rating scheme, without having to collect data upfront. Since new data sources are emerging constantly, the approach needs to easily integrate updated information.

To sum up, we position our approach within these boundaries:

- Finding a balance between highly scientific, specific and accurate approaches to measure social impact and the need to look at and rate a huge universe of assets.
- Finding the balance between computational, scientific and theoretical accuracy and the possibility of transparently communicating the approach to a broader audience.
- Finding the balance between relying on available data wherever possible without ignoring the blind spots in current data collections and if necessary, establishing mechanisms to fill these blind spots with targeted data collections.

[4] For means of simplification, this article refers to companies as investment assets. However, the same concepts and conclusions also apply to all other investment forms like real estate or state bonds.

[5] https://www.hbs.edu/impact-weighted-accounts/Pages/default.aspx.

So far, these requirements are not fulfilled by any existing measurement framework. Therefore, by blending mathematical, econometric and social sciences methods, we aim at developing an interdisciplinary and widely applicable impact measurement approach capable of analysing a large number of enterprises and data.

Synthetic Control Method

Abadie and Gardeazabal first developed the idea of artificially (synthetically) building a counterfactual out of existing data to estimate the economic costs of the terrorist conflict in the Basque Country in the late 1960s (Abadie & Gardeazabal, 2003). Since then, this method has been elaborated and applied in different contexts, both in research and practice (Abadie, 2021).

The method compares a "treated" unit j ($j = 1$) to a control synthesized from a number of possible comparison units ($j = 2, \ldots, J + 1$). In the case of impact measurement, these units can be different entities like publicly traded companies. For all these units, a number of time periods T is observed, leading to observed outcomes per unit Y_{jt}.

Furthermore, each observation has a number of k predictors to it, which can be pre-intervention values of Y_{jt} and have to be unaffected by the intervention. Supposing that $j = 1$ is the treated unit in the example, we observe the outcome of the intervention within the time period after the intervention happened, $t > T_0$, as Y^I_{1t}. To estimate the effect of the intervention, it is of interest what would have happened without the intervention. This is represented by Y^N_{1t}. By estimating this hypothetical unobserved value and subtracting it from the observed value, the effect of the intervention can then be calculated by:

$$\tau_{1t} = Y^I_{1t} - Y^N_{1t} \tag{2.1}$$

The better Y^N_{1t} provides a suitable comparison to the treated unit, the better an effect can be estimated. This suitable comparison is synthesized from the values of the "donor pool", a set of suitable unaffected units of which a weighted average is built (Abadie, 2021). Equally weighting all units in the "donor pool" results in an estimate of Y^N_{1t} as being simply the

average of the units:

$$\hat{\tau}_{1t} = Y_{1t} - \frac{1}{J}\sum_{j=2}^{J+1} Y_{jt} \tag{2.2}$$

Several possibilities are given to estimate the optimal weights that are assigned to the units in the "donor pool" to build a reliable synthetic control. Depending on the application case, a population-weighted approach might be used or the synthetic control that resembles best the values of the treated unit before the intervention based on a set of predictors X_{1k} (Abadie, 2021). For example, to estimate the economic cost of the reunification of Germany, a synthetic control of West Germany is established out of five countries (42% Austria, 16% Japan, 9% Netherlands, 11% Switzerland and 22% United States), based on the optimized predictor values of the per capita GDP (Abadie et al., 2015). The underlying idea is that the observation of a combination of unaffected units allows a more accurate comparison than observing a single unaffected unit when a small number of aggregate entities are considered (such as regions or states) (Abadie, 2021).

In the context of an impact model, like the impact value chain as described above, such a synthesized control can be used to approximate the deadweight and, hence, enables the calculation of the resulting impact. Depending on the requirements of the impact framework, choosing and weighting the "donor pool" can be as simple as taking the unweighted average of all companies from one sector. However, the method also allows for additional complexity by optimizing the choice of the "donor pool" and their weights.

Application

In general, the method described above can be applied to impact measurement in two ways:

(1) Establishing a control group in a single case study

If an entity, like a state or an organization, is observed within a single case study, the synthetic control method can be used to establish a control group (if none is given naturally). Analog to the example of West Germany mentioned above, e.g. the weighted

average of the industries of a country or the companies within an industry could be used. Measuring both, the observed entity and the established control group, against the same baseline then allows to compare and evaluate the outcomes of the acting entity. However, this procedure requires a significant methodological and computational effort for a single comparison and is therefore difficult to scale. Hence, due to the purpose of this chapter, we will not go into more detail.

(2) Using the Synthetic Control Group to establish a baseline

The alternative option is to use the synthetic control method as a baseline, i.e. as a comparative value for all companies in the sample. This will be explained in the following, using publicly available data provided in the Gender Diversity Index 2021 (GDI) by the European Women on Boards-Initiative as an example (European Women on Boards, 2021). As an outcome indicator, the share of female board members on a company's board is chosen for the Top 20 and the Bottom 20 Companies as identified in the Gender Diversity Index Report. Diversity on the board level is often associated to have a positive impact on a company (Choudhury, 2015). The example is not about the actual numbers as such but is supposed to show how different baselines influence the measured output and outcome.

The synthetic control method as described above can be used as an instrument to approximate the deadweight of an outcome variable. However, it does not represent the only possibility to do so, but rather forms part of a set of different options, as displayed in Fig. 2.2. The different options are explained in more detail in the following. It will become apparent that most deadweight approximations also carry a normative dimension with them, which is intended for demonstration purposes.

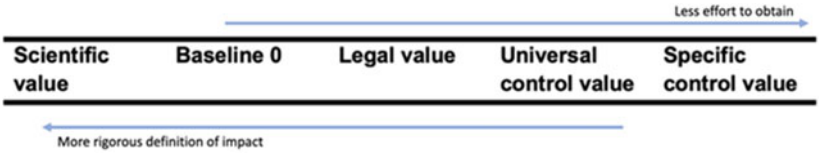

Fig. 2.2 Baseline options

Case 1 **Scientific value**

Fifty Percent of the world's population are women. One could argue that this should be represented at a company's management level as well. Another approach would be to argue with the female share in a company's workforce. A sound scientific baseline is a decision that needs to be agreed upon for rating, based upon thorough research and discussion. This is a time-consuming process that is difficult to follow if there are thousands of indicators and therefore thousands of deadweights to approximate.

We set 50% as a baseline in Case 1.

Case 2 **Baseline 0**

In some cases, it is beneficial to think of radical baselines. Water consumption for example could be reduced to a bare minimum or 0 if all water was recycled. In other cases, as for the share of female board members, the 0 baseline is not as radical, since it assumes every woman on the board is already a result.

We set 0 as a baseline in Case 2.

Case 3 **Legal value**

There are cases, in which legislations are in place that represents a compromise found in a political discussion. In the case of female board members, this compromise is often a quota, a target value to be reached. In Germany, this quota was introduced in 2016 and serves as a means to enforce the rise of female share in stock-listed company boards.[6]

We set 30% as a baseline in Case 3.

Case 4 **Universal control value**

A universal control value is a term we use for the synthetically derived value from the entire population of observed entities. There is no pre-selection or filtering applied. This process can be applied to indicators that are not sector or country-specific. If this assumption is satisfied by the share of female board members, is again a decision up for discussion.

We set the unweighted average of the entire population as a baseline in Case 4.

Case 5 **Specific control value**

A specific control value is a term we use for the synthetically derived value from a subset of the population of observed entities. Choosing a

[6] https://www.diw.de/de/diw_01.c.412682.de/frauenquote.html.

subset (e.g. one sector or country) to calculate the baseline can account for relevant sector- or country-specific properties. If the share of female board members is a sector or country-specific indicator, can be up for discussion.

We set the unweighted average of a subset of the population as a baseline in Case 5.

All cases described above lead us to the five different approximations of the deadweight displayed in Table 2.2. Whereas from bottom to top, the values allow a more sophisticated assessment of the deadweight, they need more deep discussion, research and maintenance. They also add complexity, due to the highly specified baseline for every calculation. With quality data at hand, the synthetically derived values are easy to calculate, though they bear inaccuracies. In consequence, the different approximations allow very different assessments of impact.

Table 2.2 shows an exemplary calculation of impact effects for all five cases for company A. Company A is a large stock market-listed corporation in the food and beverages industry. Case 1 compares its share of female board members to the normatively chosen 50%. Case 2 compares the share to the bare minimum of zero. Case 3 compares it to the legal value of 30%. In Case 4, company A's share of female board members is compared to the average share of female board members across the entire observed population in the dataset, which is the Top 20 and the Bottom 20 companies according to the GDI. Case 5 compares company A's performance to its peers, i.e. the sector of consumption goods & retail companies.

The example shows that the choice of the baseline significantly impacts the calculated impact effect. The synthetically derived control values are transparent and easy to derive; however, in comparison to the more research intense scientific baselines they might lack specificity and

Table 2.2 Calculation example

Case	*Approximated deadweight*	*Calculated impact effect*
Case 1	0.5	−0.03
Case 2	0	+ 0.47
Case 3	0.3	+ 0.17
Case 4	0.3	+ 0.17
Case 5	0.36	+ 0.11

normative guidance. However, additional complexity can be added to improve the synthetic approximation e.g. by adjusting the "donor pool" and weighting schemes.

Discussion

Developed within the field of policy evaluation, the synthetic control method aims at estimating the effect of an intervention on a single aggregate unit, like a state or an industry, or a small number of units when no natural control group is given (Abadie, 2021). Applying this method to the field of impact measurement, thus, it is required to assume that the stakeholders of an entity can be seen as a single aggregated unit instead of considering them individually. In terms of simplification, this assumption seems reasonable and can be fulfilled by defining a single impact chain for every stakeholder group.

In this context, the application of the simplified synthetic control method represents a relatively easy to obtain and widely applicable option to approximate the deadweight. Combined with publicly available (but company-specific) data, it is possible to calculate effects for multiple outcome indicators and, thus, evaluate the impact performance of a large number of companies. For an in-depth evaluation of one indicator or a single company, a weight-adjusted synthetic control setting is possible.

While the demand for impact performance data and evaluation is rising, so far, only a few attempts have been made in this direction (Frede, 2021). By defining multiple impact value chains with corresponding indicators and constructing the synthetical controls, a multi-dimensional impact measurement approach can be built that enables the evaluation of the impact performance of a large number of prospective investee companies. Compared to other market-used impact measurement frameworks, this procedure provides various advantages:

First, a large number of assets from different asset classes can be rated using a unified approach. Being able to rate entire diversified portfolios with the same impact model is a step towards a more unified understanding of enterprise impact and how to measure it. In addition, it allows for easier communication with the general public, since it uses a unified vocabulary. Thus, transparency and communicability are increased compared to highly specific but semantically also highly fragmented niche approaches.

In the market, a variety of ESG approaches are available that rate a large number of different assets. However, they do not measure social impact, but rather the ESG risks of a company (Simpson et al., 2021). Our approach combines or bridges the two: we aim to measure impact for a broad universe of assets. This means not being able to incorporate each niche's specialties into the approach but trying to, wherever possible, and measuring impact instead of ESG-risk. The presented approach cannot provide a detailed specified measurement of social impact for every niche. Some available approaches tend to focus on asset subgroups or specific sectors and their evaluation of social impact within this niche will often be more elaborate and precise. However, the model presented here allows us to enhance and enrich the impact model if necessary, but it should be carefully assessed, whether the gain in precision is worth the additional complexity.

Furthermore, industry- or even company-specific impact measurement prevents comparability between assets. For example, if due to flexibility and individualization a framework assigns within the same impact dimension different indicators to every company, it's not possible to compare one company to another. Therefore, the unification of indicators and corresponding deadweights may lower the degree of individualization for each asset but therefore increases comparability across all assets. However, the rating of some asset classes is out of scope for this approach: venture capital and private equity. Since the approach builds on publicly available data, applying it to the private equity context would need adaptation and additional (data) research. The outlined approach allows for setting the focus on different topics. By being able to add, enlarge and (re)group the theoretical basis of the model, the impact chains and a focus can be established. Certain topics should be indisputably part of every application case e.g. human rights issues. However, if there is the need to rate assets only regarding their water policies or only regarding their community relations, this can be realized through the approach presented here.

Staying up to date with current regulations and scientific insights is possible by using the cascading scheme of baselines. There is no need to adjust the entire approach. The baselines are a simplified deadweight, but compared to the theoretical deadweight, they are available and measurable. By using the cascading scheme, the approach also gives enough flexibility to adjust the baseline when new information becomes available.

The usefulness of the results of the approach of course depends on the data quality. If too many data points are missing, no robust calculations

are possible. However, it can be assumed that the quantity and quality of reported impact data will increase during the next years due to the rising demand of investors and regulators. Building op un publicly available data instead of primary data collection shifts the efforts and resources from collecting data to systematically integrating and evaluating the existing data. The presented approach is flexible in this regard and updated data can be incorporated when available.

Conclusion

The growth of the impact investing market is not only reflected by an increasing market volume and rising number of actors, but as well by altering needs for impact measurement. So far, only concepts and frameworks for in-depth impact evaluation of single interventions or companies exist. However, facing a growing universe of (potential) impact investee companies, investors require evaluating large company portfolios and assess their enterprise impact. Therefore, the introduction of statistical methods is needed to enable a quantitative and data-based impact measurement.

In this paper, we propose the application of the synthetic control method to approximate the deadweight within an impact value chain model. While being a means of simplification with the corresponding drawbacks, it represents a possibility to rate and benchmark a wide portfolio of companies according to various impact dimensions. The synthetic control method can hereby serve as a default value and may be complemented by other baselines (like scientific values or the baseline 0) if applicable.

So far, the approach has only been tested on exemplary data, its value and use in practice need to be tested. Still, since it builds on existing science and data, combining and applying both in the field, it enables impact measurement within a broad market and, thus, contributes to making impact investing available for the general public.

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CHAPTER 3

Impact Investments Measurement: Bridging Research and Practice

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Impact Measurement Practices in the Impact Investing Field: Challenges, Critical Issues and Perspectives

Intentionality and measurable impact are the key characteristics that allow the differentiation of impact investing from conventional forms of investment (GIIN, 2019). Over the past decade, impact measurement has

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become a common practice for understanding and evaluating the financial and social return generated by impact investments (Chen & Harrison, 2020; O'Flynn & Barnett, 2017; Verrinder et al., 2018), and it is relevant for all impact stakeholders, such as impact investors and intermediaries, investees and social enterprises, public administrations and governments (Bolis et al., 2017; Islam, 2021; Lall, 2019; Reeder et al., 2014; Ruiz-Lozano et al., 2020). Despite remarkable progress in this area, knowledge remains incomplete, and in the literature, there is a growing discussion of the "impact paradox" within impact investing (Caseau & Grolleau, 2020; Kah & Akenroye, 2020), which is characterised by the lack of accepted evaluative approaches (O'Flynn & Barnett, 2017; Strano et al., 2022). At both the theoretical and practical levels, a significant proliferation of a very heterogeneous set of principles, frameworks, methodologies, standards, metrics, and indicators emerged. The tendency to seek this variety also depends on the spectrum of impact investing tools, models, platforms, and investors.

International organisations involved in the impact investing industry are engaged in the harmonisation of practices, metrics and frameworks. In this vein, it is worth mentioning the efforts made by the European Commission to implement knowledge of the measurement of social sustainability for investments (Platform on Sustainable Finance, 2022). Additionally, for this reason, impact evaluation is becoming central to the theme of impact investment (GIIN 2019; Strano et al., 2022). In a recent work, Strano et al. (2022) identified the main strands of impact evaluation topics and their key focus areas, emphasising several facets of impact measurement approaches for the various actors and stakeholders. More specifically, there are several perspectives of impact evaluation, in relation to the different perspectives of major stakeholders: impact investors (Gianoncelli & Gaggiotti, 2021; Reeder et al., 2014; Reisman & Olazabal, 2016), the social enterprise sector (Costa, 2021; Epstein & Yuthas, 2017; Gibbon & Dey, 2011; Lall, 2019), and the public administration sector (Gębczyńska & Brajer-Marczak, 2020; Ruiz-Lozano et al., 2020). This is certainly because in impact evaluation, there is a wide range of interested parties, and each actor could have a perspective that needs specific measurement tools, methods and approaches.

Narrowing the focus on the perspective of social organisations, this work is performed to provide an empirical analysis of some practices useful for improving the consistency, effectiveness and applicability of impact measurement. By proposing an overview of some experiences and best

practices available in several reports, the study is performed to compare and investigate two measurement tools: Social Return on Investment (SROI) and balanced scorecard (BSC). The analysis was performed using various perspectives and concepts, and it is the starting point for a set of perspectives regarding how the impact stakeholders influence impact measurement instruments.

As a result of the evidence found in this work, it opens interesting directions for future research into the impact measurement field, and the findings of this study add to the existing body of knowledge with "insights" for bridging the gap between theory and practice.

Method and Materials

At the time of this writing, the impact evaluation in impact investing is a field in a state of ferment, with several new techniques under exploration that could advance a more holistic understanding in theory and practice. In view of this, we adopt a qualitative approach based on analyses of two concrete cases of evaluation in impact investing. Our previous research (Strano et al., 2022) provided a systematic literature review of evaluation in impact investing with the aim of identifying the current impact evaluation approaches adopted in the field. Our literature review showed that the main impact key actors, among which social entrepreneurship stands out for its peculiarities, have different purposes and perspectives regarding impact evaluation, and therefore require different measures and tools. On an empirical level, a range of impact evaluation methods, models, and experiences have been developed or are under development (for a classification, see Strano et al. [2022: 56–63]).

Thus, the present study takes Strano et al. (2022) findings as a theoretical point of departure, in that we develop an in-depth and comparative analysis of two practices, focusing, respectively, on social return on investments (SROI) and balanced scorecard (BSC) applications for impact evaluation in the impact investing industry from the social entrepreneurship perspective. More specifically, we analyse: (1) the case of Tomorrow's People's Getting Out to Work (GOTW), in which SROI is applied, and (2) the case of Incofin, in which BSC is used (Table 3.1). We focus on these impact evaluation tools, in accordance with the findings of Chmelik et al. (2016), who confirmed the use of SROI and BSC as

the main practices in impact measurement from the perspective of social entrepreneurship. In line with the criteria of transparency and scientific interest, we use sources of information that are publicly available (Yin, 2003). We conducted data analysis using the critical dimensions of a framework designed by Kamaludin et al. (2021) (Fig. 3.1). As stated by the authors (2021: 10) "(t)his conceptual framework provides an essential platform for academicians and researchers alike to study the connection between social entrepreneurship and sustainability. The input column contains the social entrepreneurial dimensions, which are social, economic, behaviour and governance. The social business operations are depicted by applying the theory of change, being outcome orientated or by using the logic model, which is process orientated. These business processes will produce the output, which is social impact. Social impact can be measured by using the social return on investment or the balanced scorecard method. By understanding the monetised social value or nonfinancial impact of a social enterprise, sustainability is the resulting outcome of the input-process-output model. The conceptual framework created will be the needed impetus in promoting further research in this nascent field that will be beneficial to academicians, researchers and practitioners worldwide".

Table 3.1 The case studies: an overview

Case #	*1*	*2*
Social project name	Getting Out to Work (GOTW)	Incofin Investment Management
Measurement tool	SROI	BSC
Country	Merseyside (UK)	Emerging/Developing Countries (Asia, India, Latin American, Africa)
Launch/End Year	April 2003/2005	2001/(ongoing)
Current phase	Finished/Implementation	Ongoing
Sources	Boyd (2004), Mackenzie and Nicholls (2004), Ryan and Lyne (2008), Grieco (2015)	Incofin official website available at https://incofin.com/ (last consultation in April 2022); Pineiro et al. (2018), Incofin (2020, 2021), Peetermans (2021)

Source Our elaboration

Social Entrepreneurial Dimensions	**SOCIAL:** Social Mission; Value Creation; Networks; Community; Change **ECONOMIC:** Accountability; Generates Wealth; Innovation; New Opportunities, Financially Independent **BEHAVIOUR:** Culture; Identify and Imagine; Cognition; Behave Entrepreneurially; Business-Like Behaviour; Acting Boldly; Individual Attributes **GOVERNANCE:** Governance; Autonomy
Social Impact Measurement	**MONETISED SOCIAL VALUE:** Social Return on Investment (SROI) **NONFINANCIAL IMPACT (Performance Based) :** Balanced Scorecard (BSC)

Fig. 3.1 Social entrepreneurial dimensions and social impact measurement from the perspective of social organisations (*Source* Our elaboration from Kamaludin et al. [2021: 9])

Deepening Practices of Impact Measurement Tools: An Exploration of SROI and BSC

In this section, we analyse two practices of impact measurement tools, comparing SROI and BSC. Strano et al. (2022) provide a full overview of impact measurement practices, derived by function with the classification by sector, as well as the designation of general or specific (see Table 3.2), in which both SROI and BSC are included in general sector approaches.

Despite having the same goals, both SROI and BSC are different. The first tool is a quantitative model that uses the monetising principle to measure impact in economic terms, while the BSC is a scheme of analysis that supports organisations, underlining what they should consider when evaluating social impact (Grieco, 2015).

The concept of SROI was first developed in the United States in the mid-1990s by the Roberts Enterprise Development Funds (REDF)

Table 3.2 General and Specific-sector Impact Measurement Practices: an overview

General-sector practices	*Specific-sector practices*
• Acumen Scorecard • Atkinsson Compass Assessment For Investors (ACAFI) • Bagnoli And Megali Model • B Ratings System • Best Available Charitable Option (BACO) • Bop Impact Assessment Framework • Balanced Scorecard (BSC) • Comparative Constituency Feedback • Cost–Benefit Analysis (CBA) • Center For High Impact Philanthropy Cost Per Impact • Charity Assessment Method Of Performance (CHAMP) • Chat (Charity Analysis Tool) • Compass Assessment For Investor • Dots (Development Outcome Tracking System) • Fair Trade Certification • Hewlett Foundation Expected Return • Hip (Human Impact + Profit) Framework • Social Impact Navigator • Local Economic Multiplier (Lem) • Measuring Impacts Toolkit • Measuring Impact Framework (MIF) • Methodology for Impact Analysis And Assessment (MIAA) • Millennium Development Goal Scan (MDG-Scan) • Movement Above the Us $1 A Day Threshold Project • Ongoing Assessment of Social Impacts (OASIS) • Outcome Mapping • Participatory Impact Assessment • Portfolio Data Management System (PDMS) • Poverty Social Impact Assessment (PSIA) • Progress out of Poverty Index (PPI) • Process Tracing • Political Return On Investment (PROI)	• Civicus Civil Society • Dalberg Approach • Ecological Footprint • Environmental Performance Reporting System (EPRS) • FIT for purpose • Gamma Model • Health Impact Assessment (HIA) • Leadership in Energy and Environmental Design (LEED) • Outcomes Star • Real Indicators of Success in Employment (RISE) • Scalers Method • Social Investment Risk Assessment (SIRA) • Social Footprint • Social Value Metrics • Trucost • Well Venture Monitor

(continued)

Table 3.2 (continued)

General-sector practices	*Specific-sector practices*
• Public Value Scorecard (PVSC) • Robin Hood Foundation Benefit–Cost Ratio • Randomised Controlled Trials (RCT) • Social Auditing and Audit (SAA) • Social Impact Measurement for Local Economies (SIMPLE) • Social Compatibility Analysis (SCA) • Social Cost-Effectiveness Analysis (SCEA) • Social Costs-Benefit Analysis (SCBA) • Social E-Valuator • Social Impact Assessment (SIA) • Social Rating • Social Return Assessment (SRA) • Socio-Economic Assessment Toolbox (SEAT) • SROI Analysis • SROI Calculator • SROI Framework • SROI Lite • SROI Toolkit • Stakeholder Value Added (SVA) • Toolbox for analysing sustainable ventures in developing countries	

Source Our elaboration from Strano et al. (2022: 60)

with the aim of measuring how much change is being created by tracking relevant social, environmental, and economic outcomes. In the sector of social enterprises, this method can measure broader social or environmental economic outcomes, analysing and computing the needs of multiple stakeholders in a singular monetary ratio (Grieco, 2015; Kamaludin et al., 2021; Lall, 2017; Mäkelä, 2021; Mamabolo & Myres, 2020; Perrini et al., 2020; Watson & Whitley, 2017).

It should be noted that SROI does not evaluate money, but it measures the creation of value by using money as a unit of measure. In this way, SROI is described as an instrument towards identifying and appreciating value created based on a set of principles: (1) to involve stakeholders in the process of understanding their real needs, expectations and perceptions; (2) to measure negative and/or positive effects that can be derived

by intervention; (3) measuring internal and external impacts (such as cultural, those of employees), identifying the time horizon (short or long) within which the impact is made; (4) to include only the impacts that can be realistically attributed to the intervention or organisation or project; (5) to avoid overstating impacts without including the same indicator in both the social and financial evaluations; (6) to compare the social performance with the next best alternative, focusing on the benefits generated for all stakeholders; (7) to also consider the risks that can impede the project; and (8) to constantly monitor the results to avoid discrepancy and evaluate the improvement (Davies et al., 2019; Grieco, 2015).

Finally, the SROI methodology measures the blended value, monetising both economic and social value to measure the total amount of financial investment and calculating the ratio between the blended value (net of costs) and the financial investment for estimating a rate of return (Arvidson et al., 2013; Grieco, 2015). The SROI equation can best be represented by a formula that states a ratio of the return on investment resulting from an organisation's enterprises combined with the value of its activities used for the achievement of its social purpose (Moody et al., 2015).

Instead, the BSC represents a performance measurement and management tool, supporting organisations in translating their vision and strategies into concrete actions (Chmelik et al., 2016). This tool was first introduced by Robert S. Kaplan and David P. Norton in the 1990s (Kaplan & Norton, 1996), particularly for the private sector.

In consideration of the advantages related to the use of the BSC, it was subsequently introduced in the public and nonprofit sectors, adapting it to the specific purposes of these organisations (Kaplan, 2001; Kaplan & Norton, 2001; Rohm et al., 2006). Indeed, the only financial results of the BSC are not able to capture the value created by the activities because the financial measures are 'lagging indicators', and it does not identify the drivers or activities that affect financial results (Kaplan & Norton, 2001). For these reasons, the BSC is conceptualised by encompassing a new set of measures, as well as social and environmental measures, within Kaplan and Norton's original BSC (Kaplan, 2001; Kaplan & Norton, 2001) to help the social organisation sector demonstrate and present its values to relevant impact stakeholders (Hoque, 2014; Kaplan & Norton, 2015; Kaplan & McMillan, 2020; Kamaludin et al., 2021).

A new approach provides a comprehensive conceptualisation of performance measurement (Asiaei & Bontis, 2019), creating a strategic map

with four levels that are the most important for the social organisation (Kročil & Pospíšil, 2018): (1) financial perspective (measures in this perspective should answer the following question: how do we look to shareholders?); (2) customer perspective (measures in this perspective should answer the following question: how do customers see us?); (3) business processes (measures in this perspective should answer the following question: what must we excel at?); and (4) learning and growth (measures in this perspective should answer the following question: can we continue to improve and create value?) (Grieco, 2015: 71).

Case Analysis

In this section, we propose an overview of the two best practices with the aim of deepening the impact measurement.

The case of Tomorrow's People's GOTW illustrates how SROI is practically implemented by social enterprises, while the case of Incofin represents an example of practice based on an application of the BSC model.

More information about the main characteristics in terms of both case descriptions and social issues of intervention, and the metric and impact results are available in Table 3.3, which illustrates the key characteristics of the cases.

To provide 'guidelines' for how to label and code these research observations, Fig. 3.2 proposes a coding frame for providing the concepts and the criteria used to identify and sort the associated observations, as well as the rules adopted in each case selected.

Case 1—Tomorrow's People's Getting Out to Work (GOTW) Initiative—Merseyside (UK)

In 2003, Merseyside was the English county with the highest deprivation and unemployment rates, and the population most affected was young ex-offenders 16–24 years of age residing in one of the Merseyside boroughs of Liverpool, Knowsley, Sefton, St. Helens or Wirral, for whom recidivism was a chronic problem.

To solve this challenge, in April 2003, the social enterprise Tomorrow's People implemented the 'Get Out to Work (GOTW)' to support people in getting a sustainable job in the Merseyside (UK) country through the highly personalised coaching and networks that it has provided, imparting

Table 3.3 GOTW and Incofin: key characteristics

Case #	*1*	*2*
Social project name	Getting Out to Work (GOTW)	Incofin Investment Management
Case description and social issue of the intervention	Criminal Justice: to reduce reoffending rates and improve employment by helping young offenders gain long-term, sustainable employment	Impact oriented-funds specialising in rural financial inclusion and the agri-food value chain, providing opportunities for vulnerable or less privileged people to improve their lives
Essential characteristic metric and impact result	The social value created by the GOTW program is £492,000, or £4470 per participant. The projected SROI ratio has been 10.5:1	As of December 2019, Incofin has invested 2.7 billion in 65 emerging countries to accelerate financial inclusion towards more sustainable agriculture (supporting 330,000 smallholder farmers) with direct investments in 164 financial institutions
The case's distinctive element	The first study that has tracked the impact of target participants for a long time (12 months after employment), showing that customised and intensive support for ex-offenders can significantly improve their chances of finding long-term, sustainable employment	Incofin's investment strategy represents an example of impact practice, aligning with the SDGs, showing how it increases the productivity of organisations in sustainable terms

Source Our elaboration from Boyd (2004), Mackenzie and Nicholls (2004), Grieco (2015)

transferable skills, such as curriculum vitae preparation and interview techniques. Tomorrow's People has been supported through grant funding by Diageo Great Britain and the European Social Fund. Indeed, the program has adopted a holistic approach to service delivery, creating a network of multiagency partnerships at the local, regional, and national levels and throughout the private, public and voluntary sectors (Boyd, 2004; Grieco, 2015; Mackenzie & Nicholls, 2004).

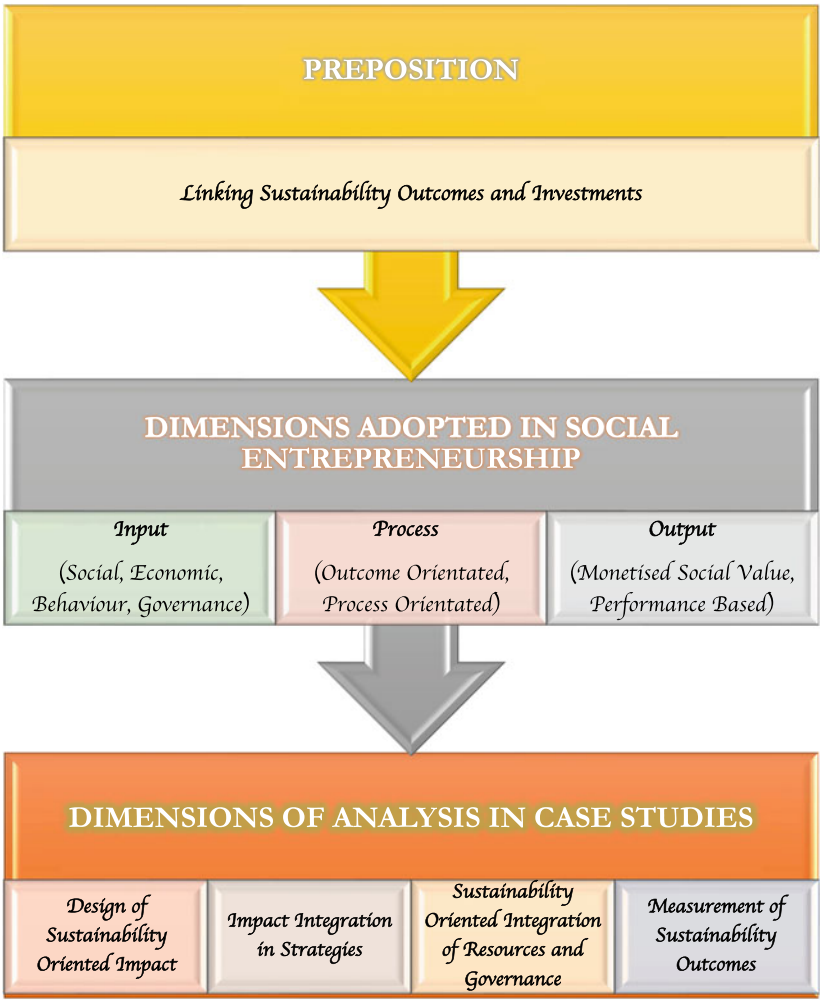

Fig. 3.2 From social entrepreneurial dimensions to social impact measurement: building a coding frame (*Source* Our elaboration)

To implement the initiative, the costs were £51,000 per year, and its social impact was measured against three main goals: (1) to help 163 offenders over the first 2 years; (2) to ensure that at least 12 people find a job after the initiative; and (3) to reduce the reoffending rate. At the end of the first year, the GOTW initiative helped 110 people, 19 of whom were still employed after 10 months, and the reoffending rate was 15% lower than the national average. Table 3.4 illustrates the GOTW Social Impact Chain.

As the program's objectives have focused on the increase of sustained employment and the reduction of reoffending rates for the participant group, the analysis has considered the benefits for both participants and the State. By using the SROI model, these outcomes have been monetised and projected into a five-year timeframe using three different financial proxies: (1) the benefit for the clients, based on their income; (2) the benefit for the State, based on the money that it would have had to provide the unemployed; and (3) the reduction in reoffending, leading to lower crime-related costs (Boyd, 2004; Grieco, 2015; Mackenzie & Nicholls, 2004).

The program generated an overall social impact equal to £543,000. The SROI ratio is calculated as the ratio between the overall social impact and the required investment; for the GOTW initiative, the result is equal to £543,000/£51,000 = £10.5. This result expresses the amount of social impact that is created for every £1 spent on the program. Thus, for the

Table 3.4 GOTW social impact chain

INPUT	*OUTPUT*	*OUTCOME*	*IMPACT*
£51,600 (grant funding)	110 (participants from April 1, 2003 to March 31, 2004)	19 (participants employed as of March 31, 2004)	17 (of whom remained employed as of June 30, 2004) *DEADWEIGHT* 2 (participants who found work without the GOTW initiative)
INDIRECT: 15–20% lower than national averages			

Source Our elaboration from Boyd (2004), Mackenzie and Nicholls (2004), Grieco (2015)

Table 3.5 GOTW SROI: an overview

Financial proxy	*Social impact*	*Value added (total)*	*Value added (per participant)*
1.Benefits (participants) 2.Benefits (the State) 3.Benefits (society) GOTW SROI 10.5:1 (£543,300/£51,600)	£543,300	£491,700 (£543,300–£51,600)	£4470 (£491,700/110)

Source Our elaboration from Boyd (2004: 6.3), Mackenzie and Nicholls (2004: 14, 26), Grieco (2015: 70)

GOTW initiative, it was possible to say that for each £1 invested, the program created £10.5 value for society.

Table 3.5 proposes an overview of the GOTW SROI (Boyd, 2004; Grieco, 2015; Mackenzie & Nicholls, 2004).

Figure 3.3 illustrates the application of the framework to our case. Table 3.6 proposes the social project operation, as well as the process, based on the outcome-oriented model (illustrating its Impact Map or Theory of Change), and, finally, Table 3.7 provides the impact measurement based on the SROI analysis for monetising the social value generated by the program.

Case 2—Incofin Investment Management–Emerging and Developing Countries

Incofin is an Alternative Investment Fund Manager licenced impact fund management company, with a specific focus on financial inclusion and agri-food value chains.

As of December 2020, Incofin's capital has served more than 87 million individuals and 800,000 small businesses across the US and in over 100 countries and in particular, in 65 emerging countries, to accelerate financial inclusion towards more sustainable agriculture, supporting approximately 330,000 smallholder farmers. In 2020, the Incofin portfolio totalled nearly $415 million across 108 loans and investments, disbursing $150 million to finance small businesses and entrepreneurs, affordable housing, affordable solar energy, energy efficiency upgrades, sustainable fisheries and more (Incofin, 2021).

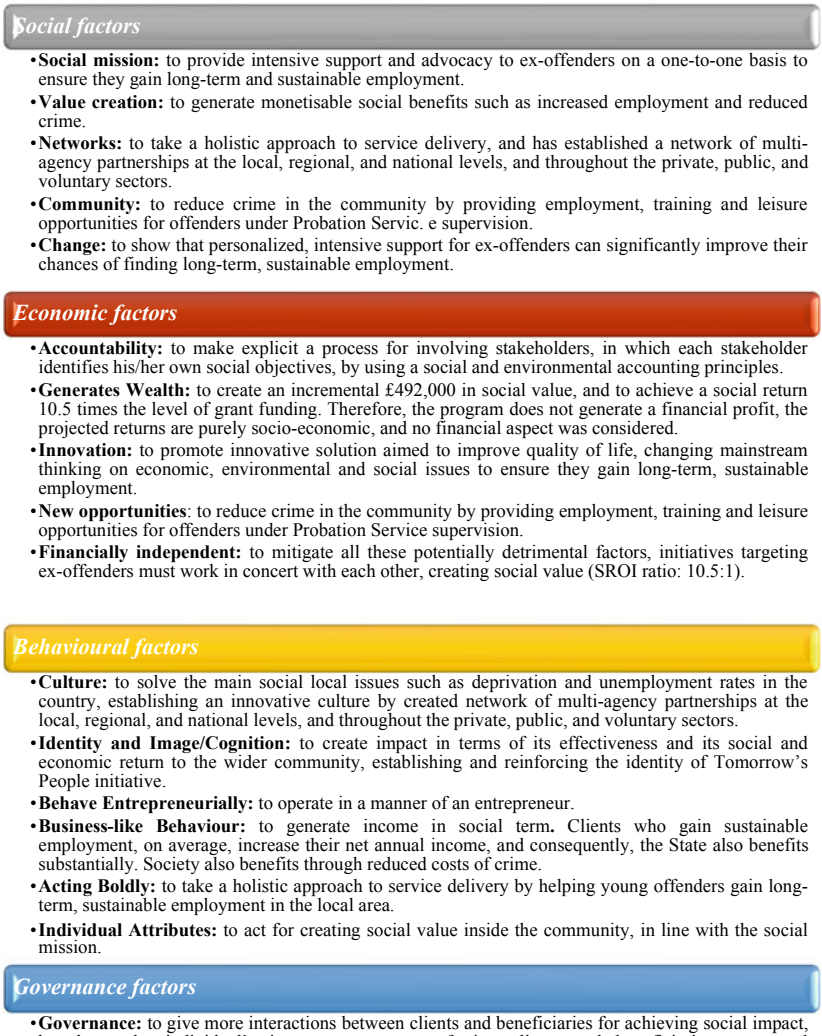

Fig. 3.3 The application of the conceptual framework to the "Tomorrow's People initiative" case (*Source* Our elaboration from Boyd [2004], Grieco [2015], Mackenzie and Nicholls [2004])

Table 3.6 Outcome-oriented process: GOTW's Theory of Change

Stakeholders	*Input*	*Output*	*Outcomes*	*Impact*
Participants (tot.110)	Participant time and skills	Job interview	(1) Sustainable job (2) Reduced reoffending rates for the participant group (3) Stable income (4) Improved life stability	Deadweight: Number who would have obtained jobs without GOTW% of clients who would not have reoffended anyway
The State	Not applicable	Not applicable	(1) Sustainable job (2) Reduced reoffending rates for the participant group (3) Reduced welfare (4) Benefits Increased tax contribution	Deadweight: Number who would have obtained jobs without GOTW % of clients who would not have reoffended anyway

Source Our elaboration from Boyd (2004), Mackenzie and Nicholls (2004), Grieco (2015)

Table 3.7 Monetised social value

Social impact	*Value added*	*GOTW SROI*
£543,300	£491,700 (total) £4470 (per participant)	10.5:1

Source Our elaboration from Boyd (2004: 6.3), Mackenzie and Nicholls (2004: 14, 26), Grieco (2015: 70)

In addition, Incofin has encouraged both direct investments in 164 financial institutions and debt and quasi-equity financing to over 300 investees by receiving USD 75 m as premiums by investees through certifications.

The latter results have allowed the generation of more than 854,000 hectares of sustainable cultivated land, and approximately 13,396 farmers have trained on good agricultural practices, increasing productivity by

6% in producer organisations. The average annual loan loss rate over the total loans disbursed is 0.04%, demonstrating the debt team's ability to develop a high-quality portfolio over a sustained period of time. In addition, with a strong investment track record diversified across 14 countries and 10 different crops, the agro-finance portfolio has provided more than 48 m USD in financing to smallholder farmers with direct investments in 164 financial institutions (Incofin, 2020; Incofin official website [see: https://incofin.com/portfolio/. Last consultation in April 2022]). In 2020, Incofin supported 419,652 farmers, generating $113.4 million in revenue by selling products certified as sustainable (Incofin, 2021).

By focusing on specific markets, including base of the pyramid populations, smallholder farmers, rural micro, small and medium enterprises, and fair-trade producer organisations, Incofin has worked with socially responsible financial intermediaries, producer organisations and agri-businesses to achieve the fund's impact objectives. Incofin aims to support beneficiaries excluded both geographically (such as emerging markets, post-conflict zones and fragile states) and economically (especially for less privileged people for improving their lives).

Indeed, it sustains vulnerable communities, targeting smallholder farmers and fair-trade producer organisations by focusing on agri-financing which has growth potential to generate long-term impact, as smallholders represent the world's poor and contribute more to total global food production (Incofin, 2020, 2021; Peetermans, 2021; Pineiro et al., 2018).

Incofin bases its impact strategy on the double bottom line of value creation for generating simultaneous financial returns and social and environmental goals through the implementation of the social performance management that allows monitoring outcomes for the impact stakeholders (Incofin, 2021; Incofin official website [see: https://incofin.com/tag/social-impact/. Last consultation in April 2022]; Pineiro et al., 2018). Indeed, in line with its mission to combine financial and social performance, Incofin was awarded as an asset management company in 2021 by the Global Banking & Finance Review, demonstrating its growing mainstream awareness of happenings in the impact investment space (Incofin official website [see: https://incofin.com/impact/. Last consultation in April 2022]).

In addition, Incofin is involved in several sector initiatives in connection with social performance, allowing a company's social mission to be put into practice. In more detail, Incofin is a founding member both for the Global Impact Investing Network (a nonprofit organisation dedicated to increasing the scale and effectiveness of impact investing) and signatory for the Principles for Investors in Inclusive Finance (Incofin official website [see: https://incofin.com/impact/. Last consultation in April 2022]).

Supported by the Multilateral Investment Fund of the Inter-American Development Bank Group, the Rural Finance Partnership in both Latin America and the Caribbean, Incofin aims to enhance the financial inclusion of low-income rural communities to improve their economic conditions. In addition, Incofin is collaborating with Cerise, a nonprofit service provider that works to promote ethical and responsible finance, developing the most widely recognised social audit tool in the financial inclusion industry called SPI4, based on the BSC model (Incofin official website [see: https://incofin.com/impact/. Last consultation in April 2022]).

Social Performance Management represents an application of the BSC theory for building impactful social businesses. Incofin's impact accountability is composed of four dimensions, combining impact methodology with the investment process (see Fig. 3.4). This systematic approach allows us to assess whether the organisation has aligned social, environmental and economic goals.

The impact thesis defines the link between the potential impact investment and the values of Incofin, while defining whom it will benefit and from which projects, the predetermined intents, and the tools that will be used to do so. Thus, this first part was able to select the right projects for the company.

This means that the impact thesis is specific for each Incofin fund, designed to provide: (1) clarity on assessing whether the potential investment has social impact; (2) transparency between the investment manager and investment committee; and (3) ease of application thought a predefined impact thesis framework. In addition, the impact thesis assesses: (1) intentionality, as well as the achievement of impact and alignment to good social performance management practices; (2) the targeted final customer; (3) the benefits promoted by service providers; and (4) the way in which investees provide their services (Incofin, 2020, 2021; Incofin

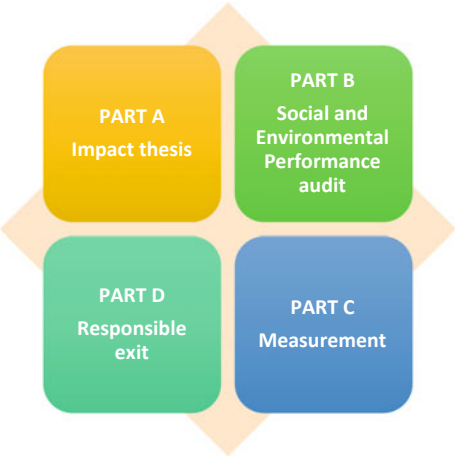

Fig. 3.4 Incofin's impact methodology in the impact investment process (*Source* Our elaboration from Pineiro et al. (2018), Peetermans (2021), Incofin (2021), Incofin official website [see: https://incofin.com/impact/. Last consultation in April 2022])

official website [see: https://incofin.com/impact/. Last consultation in April 2022]; Pineiro et al., 2018).

By using the BSC, the social and environmental performance audit allows the implementation of a due-diligence process.

To promote responsible financial inclusion—a cornerstone of consumer protection—and to align with the United Nations Sustainable Development Goals, Incofin has developed two in-house audit tools: ECHOS and Social Business Scorecard.

The first instrument represents an online platform based on a full set of social and environmental due-diligence parameters for taking investment decisions with questionnaires that can be adapted and customised for each individual deal, depending on the business line. The platform allows stakeholders to measure the key development indicators, facilitating the monitoring and tracking of those indicators over time and improving investment decisions.

Instead, the second tool allows financial institutions to better understand their clients' needs and to be more results—and outcomes-oriented. Indeed, the latter tool is a self-assessment for social businesses to assess themselves against practices that are relevant to a socially driven enterprise (Incofin, 2020, 2021; Pineiro et al., 2018).

In the measurement part, Incofin evaluates the outcomes of its investment both at a fund and an investee level for improving practices and

measuring the real impact of the business. Among the areas of measurement, Incofin aims to increase customers, sustainable production of products and services and the number of jobs both created or maintained, to support higher standards of living, economic growth, financial inclusion, access to green energy, etc.

Therefore, the indicators are specific to each fund and Incofin measures the outcomes of its investment at both the fund and investee levels, also tracking also the output of the end client throughout the life of the investment. Some of the areas measured and tracked include: new customers obtaining access to financial products, additional credit to smallholder farmers and small-medium enterprises, increments both in agricultural production and employment of females in the workforce, and greater training and delivery of programs. This allows us to track changes at the end-customer level, in terms of income, employment, health, education, housing, gender equality, etc., depending on each social mission. Therefore, the indicators identified include those that promote social performance management practices but also impact the final customer (Incofin, 2020, 2021; Pineiro et al., 2018). Finally, the responsible exit ensures that each exit achieves the financial objectives of the investees and the impact is also sustained post-exit, disclosing to stakeholders the indicators reached and the impact created. The main factors taken into consideration include the reputation and image in the market (sector experience), the stability of leadership, the commitment to social performance, the rationale (intent) for investment, and the cultural adaptation (Incofin, 2020, 2021; Pineiro et al., 2018).

Figure 3.5 illustrates the application of the framework to our case. Table 3.8 proposes the Social Performance Management, as well as the process, based on the outcome-oriented model (illustrating its Theory of Change), and, finally, Table 3.9 shows the impact measurement based on the BSC model for measure the performance generated by Incofin Investment Management.

Discussion and Conclusions

In the analysis of the two case studies addressed in this chapter, we analysed two main methods of integrating of sustainability outcomes into financial investment indicators. In detail, the SROI and the BSC present different perspectives of analysis that determine the appropriateness of such adopted methods for the measure and report of sustainability outcomes obtained from a financial investment.

Social factors

- **Social mission:** to promote inclusive progress in emerging countries for beneficiaries excluded both geographically and economically.
- **Value creation:** to improve live for less privileged people, generating value creation through inclusive progress.
- **Networks:** to mobilize donor funding for implementing or building programs that respond to the real needs of investees, Incofin creates a well-established network of service providers for ensuring to clients the right expertise and support, allowing to monitor the project development, and consequently, evaluating results and measuring impact for investees and for end clients. Indeed, Incofin is involved in several sector initiatives in connection with social performance, allowing to putting a company's social mission into practice.
- **Community:** to improve the living conditions of vulnerable communities in developing countries supporting by providing risk capital to sustainability.
- **Change:** to provide debt and quasi-equity financing to over 300 investees across emerging countries, in addition to direct impact investments around USD 2,7 billion in over 65 developing countries for supporting sustainability and financial inclusion, and agri-food value chains.
- **Change:** to show that personalized, intensive support for ex-offenders can significantly improve their chances of finding long-term, sustainable employment.

Economic factors

- **Accountability:** to make explicit a process for involving stakeholders, impact accountability combines impact methodology with the investment process adapted and customized for each individual deal, depending on the business line by integrate financial with social performance. Indeed, Incofin is involved in several sector initiatives in connection with social performance using a social and environmental accounting principles to be more impact results and outcomes-oriented.
- **Generates Wealth:** in November 2021, with more than 30 equity investments including a strong exit track record, Incofin has helped build and support solid institutions serving millions of clients globally, acting like hands-on investor, as well as "co-pilot" for the institutions we support. In addition, Incofin has provided debt and quasi-equity financing to over 300 investees across 65 countries and the agro-finance portfolio has provided more than 48m USD in financing to smallholder farmers diversified across 14 countries and 10 different crops.
- **Innovation:** to promote sustainable solution aimed to improve quality of life of base-of-the-pyramid populations, smallholder farmers, rural micro, small and medium enterprises, and fair-trade producer organisations.
- **New opportunities**: to increase quality life of poor people, contributing simultaneous to SDGs.
- **Financially independent:** to mitigate economic risks and to contribute to social performance of firms, Incofin adopts Social Performance Management based on BSC theory.

Behavioural factors

- **Culture:** impact is the core of Incofin's existence and operations and it represents a commitment beyond investment, ingrained into Incofin's corporate culture and mission for pursing real positive outcomes that make a tangible difference for small entrepreneurs in emerging and developing countries.
- **Identity and Image/Cognition:** to create impact in terms of its effectiveness and its social and economic return to the wider community, establishing and reinforcing the identity. Indeed, the main factors taken into consideration include the reputation and image in the market (sector experience) and the stability of leadership.
- **Behave Entrepreneurially:** to operate in a manner of an entrepreneur, generating simultaneous financial returns and social and environmental goals.

Fig. 3.5 The application of the conceptual framework to the "Incofin Investment Management" case (*Source* Our elaboration from Incofin [2020, 2021], Incofin official website [see: https://incofin.com/impact/. Last consultation in April 2022], Peetermans [2021], Pineiro et al. [2018])

- Business-like Behaviour: to increase performance in social term, committing beyond investment.
- **Acting Boldly:** to adopt a strategy based on the double bottom line of value creation both economic and social through the implementation of the Social Performance Management that allows to monitor outcomes for impact stakeholders.
- **Individual Attributes:** to act for creating social value inside the emerging countries, in line with the social mission.

Governance factors

- **Governance:** to give more interactions between clients and beneficiaries for achieving social impact, Incofin has been collaborating with socially responsible financial intermediaries, producer organisations and agri-businesses for achieving the fund's impact objectives, focusing on specific markets (such as base-of-the-pyramid populations, smallholder farmers, rural micro, small and medium enterprises, and fair-trade producer organisations, etc.).
- **Autonomy**: to provide self-governing operation the program has involved several partners in initiative for delivering a consistent pattern of successful investments with impact and returns for investors, investees and clients.

Fig. 3.5 (continued)

Table 3.8 Outcome-oriented process: Incofin's Theory of Change

Stakeholders	*Inputs*	*Activities*	*Outcomes*	*Impact*
Theory of change is specific for each stakeholder based on its specific social mission	Poor rural households and small entrepreneurs in developing countries excluded both geographically and economically	To improve the performance of businesses. To provide: (1) debt and quasi-equity financing to investees across emerging countries; (2) risk capital to sustainability-focused producer cooperatives and agro SMEs; (3) donor funding to implement specific programs that respond to the needs of investees	To achieve tangible outcomes for small entrepreneurs in emerging and developing countries. Since the investees have diverse business models, the outcomes are developed in line with their nature and objectives which are among those mapped in SDGs	Pursuing balanced long-term returns that reflect the interests of clients, retail providers and end investors in terms of income, employment, health, education, housing, gender equality, etc., depending on each investee's social mission

Source Our elaboration from Incofin (2020, 2021), Incofin official website (see: https://incofin.com/impact/. Last consultation in April 2022), Peetermans (2021), Pineiro et al. (2018)

Table 3.9 Balanced scorecard: performance-based (nonfinancial impact)

Financial perspective	*Customer perspective*	*Internal perspective*	*Learning and growth perspective*
Pursuing balanced long-term returns that reflect the interests of clients, retail providers and end investors	The client-centric approach remains at the heart of the investees' business model	Developing in-house audit tools to better understand their clients' needs and to be more results- and outcomes-oriented to promote rural financial inclusion and agro-food chain	Aligning to the highest professional standards and ethics, sustaining the culture of diversity, entrepreneurship, mutual respect, and willingness to listen for ensuring transparency and practicality, both internally and externally

Source Our elaboration from Incofin (2020, 2021), Incofin official website (see: https://incofin.com/impact/. Last consultation in April 2022), Peetermans (2021), and Pineiro et al. (2018)

If the SROI method offers quantitative monetisation of impact, the BSC offers a management tool to evaluate and monitor (and in this case, adjust) the progress of the impact achieved with an investment decision. Both revealed potential and limitations.

BSC represents a model of performance management that is already mature and has been deeply explored within the management research field. In the cases under analysis, it is possible to observe how the four traditional elements of a BSC (financial, customer, internal business process and learning) the following fifth perspective was added: sustainability outcomes. More specifically, from this case emerges the creation and development of a sustainability balanced scorecard (SBSC) which highlights the importance of the social and environmental goals of an investment. In brief, an SBSC provides the means for measuring the triple bottom line of a sustainable investment: (economic) prosperity, people (social justice) and planet (environmental protection). Moreover, the map of outcomes with an SBSC can cover a longer period (medium, up to five years) of tracking sustainable outcomes, such as in the case analysed. Beyond the medium–long-term effects, the mapping of value creation included in an SBSC cover also covers the inclusion of innovative and sustainable processes. The identification of enabling factors and resources

in the adoption of such forms of measurement represents the frontier of research in future studies regarding this field.

On the other hand, SROI practice represents a way to provide a measure for the monetisation of impact. In other words, SROI presents how social, environmental and economic outcomes create impact, measures the value created and uses financial terms as a common denominator to express this value. However, SROI also has its limitations: it leaves room for subjective perception, while it allows for discretion in setting the indicators and quantifying the impact. This makes it possible to lead to misunderstandings about how to interpret the SROI ratio obtained. Not all types of impact can be expressed with numerical indicators. In other words, its usefulness depends on how organisations want to use it, and on the characteristics of the social value created. Such elements represent the research frontiers that scholars interested in this topic can focus on in their future studies.

From the analysis conducted in the case studies, two main results need to be highlighted: (i) the advantages resulting from the adoption of the proposed framework of analysis in the two impact measurement tools, and (ii) how the inclusion of the dimensions identified in our framework contribute to a theory development in this topic. First, the adoption of an impact monetisation tool, such as SROI, and of an impact performance management tool, such as BSC, in an impact investment could be useful for investors in a variety of cases. For instance, they appear to be suitable for building a more effective investing, by allowing comparison among similar alternatives and weighting impact returns within a portfolio of impact investment opportunities. Moreover, the use of such assessment tools can easily facilitate both organisational learning and the establishment of an accountability framework. More specifically, the two cases were analysed under the consideration of three main dimensions, economic, social and governance factors, by framing into these three dimensions the social/environmental impact produced by the investments. This could be useful for the compliance of the growing nonfinancial disclosure regulations, particularly in ESG investments. Thus, the proposed level of analysis should help scholars and practitioners active in this field to develop frameworks of ESG/sustainability analysis of investments considering these two forms of assessments in accordance with the aim of the impact assessment. In simplified terms, an impact assessment developed considering such dimensions could generate data useful both to provide ESG

performance (and the related impact risk exposure) or ex post ESG performance by considering a BSC or an SROI approach, respectively. In this sense, the exploration of such sustainability-linked assessment tools in the issues related to nonfinancial reporting, sustainable investment disclosure compliance and related areas, represents a fast-growing field of analysis for future studies addressing impact assessment for sustainable investment reporting activities.

In conclusion, our study performs a case study analysis useful for comparing two of the main forms of integrating sustainability outcomes into financial investments. From the comparison of the two methods emerged points of discussion and new frontiers for financial studies deriving from such methods of integration of extra-financial values in addition to traditional financial indicators. The potentials and limitations of the two models have been highlighted by providing evidence for future avenues of research. Finally, our research emphasises the need to better understand sustainability-oriented investments as a multistakeholder process that includes a multifaced mechanism of measurement of social, economic and environmental impact.

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CHAPTER 4

ESG Ratings, Scores, and Opinions: The State of the Art in Literature

Mario La Torre, Mavie Cardi, Sabrina Leo, and Jacopo Schettini Gherardini

Introduction

The strategic relevance of Environmental, Social, and Governance (ESG) issues in the definition of corporate and institutional policies has been increasing in recent years. Firstly, the integration of ESG elements in operational approaches can give rise to opportunities in terms of company

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performance. Secondly, the ongoing development of sustainability-oriented methods is further underpinned by medium- to long-term institutional policies.

Overall, sustainable finance is currently the focus of European institutional initiatives: this is confirmed by the contents of the Next Generation EU Recovery Plan and by the policies for the development of sustainable finance in the European Green Deal. The Sustainable Development Goals defined by the United Nations are also moving in the same direction.

Regarding disclosure requirements related to environmental and social challenges, Directive 2014/95/EU (Non-Financial Reporting Directive, NFRD) sets out the rules on disclosure of non-financial information by certain large companies. The rules are supplemented by the guidelines published by the European Commission (June 2017) with specific reference to environmental and social information disclosure. The current NFRD reporting requirements have recently been subject to a proposal for amendment by the Commission, which adopted a proposal for a Corporate Sustainability Reporting Directive (CSRD) on 21 April 2021. The proposal expands the range of companies that must comply with the regulation mentioned above, including all large companies and companies listed on regulated markets. The proposal also requires that reported information must be audit-reviewed and introduces more detailed reporting requirements in line with mandatory EU sustainability reporting standards.

The proposal is designed to better reflect sustainability preferences in investment advice and sustainability considerations in product governance and fiduciary duties.

Other regulatory schemes to be mentioned here concern governance profiles: the subject, the Directive 2017/828 (Shareholder Rights Directive II, SHRD II) establishes specific requirements to encourage shareholders' long-term engagement. Environmental and social issues are considered particularly relevant.

Given the importance of the overall issue, the role of Environment, Social and Governance aspects have become a notable area of analysis. At the same time, the rise of sustainable investments makes ESG ratings increasingly significant to investors and issuers.

Considering the above, we chose to focus our analysis on the specific perspective of ESG ratings.

Regarding this profile, many of the existing studies primarily concentrate either on the impact of ESG information on the market (i.e., among

others, the relationship between ESG factors on portfolio performance and the effect on stock price) or on the reliability of ESG indexes in incorporating companies' ESG information. ESG ratings and scores are of particular interest to academics and analysts. They comprise a broad group of products designed to provide investors with an independent, data-driven assessment of ESG aspects. Looking at the European Green Deal, ESG ratings are expected to grow in importance even though they are currently not regulated. There is no official or shared definition of ESG ratings. In a recent letter to the European Commission, ESMA (2021) proposed the following broad definition: "*ESG rating means an opinion regarding an entity, issuer, or debt security's impact on or exposure to ESG factors, alignment with international climatic agreements or sustainability characteristics, issued using a defined ranking system of rating categories*".

ESG ratings, scores, and other quantitative ESG assessments can measure different aspects. The heterogeneity of ESG rating outcomes due to different methodologies adopted by ESG rating providers and an unclear distinction among ratings, scoring, and opinions leads to multi-dimensionality of information processed in different ways by information providers; implications relate to disclosure profiles and overall quality of ESG information.

In light of the above, there is space and a need for further development in the related literature. For this reason, the main research question of the paper is: *what are the main trends analysed in the literature on ESG ratings, scores, and opinions*? The basic assumption is that the existing literature tends to focus on specific issues and leaves other areas of inquiry uncovered, e.g., by not drawing appropriate distinctions in terms of methodologies, definitions, and relationships to ESG-related risks.

Starting from this assumed gap and considering the increasing importance that ESG factors will assume in the light of the new global challenges, this paper proposes a bibliometric and systematic review of the literature on ESG ratings, scores, and opinions. The aim is to investigate the most widespread strands of analysis (starting from those mentioned above) and which emerging trends provide significant evidence for ESG rating research, although they are less investigated. The paper follows the traditional systematic literature review analysis approach using data visualisation techniques (Denyer & Tranfield, 2009; Fink, 2013).

The study contributes to the advancement of ESG rating, scoring, and opinion by verifying which aspects have been most explored and less also

referring to the financial sector. Results highlight the need to broaden the empirical research helpful base for future development of a common methodological approach by ESG rating providers. The review also highlights, among other things, how a more significant effort of analysis is needed, also to identify possible ways to accelerate the construction of a market for ESG ratings.

The paper is structured as follows: Sect. "Research Methodology" describes the research methodology used, explaining the steps that led to the paper collection from the Scopus database; Sect. "The Bibliometric Analysis" runs the bibliometric analysis and reports the findings using bibliometric software; Sect. "Systematic Analysis" is focused on the systematic literature review based on the categorisation of the selected articles into clusters according to contextual similarities; Sect. "Conclusion" provides the main conclusions and highlights the current gaps in the existing literature on ESG ratings.

Research Methodology

The paper is based on the traditional methodology of systematic literature reviews mentioned to identify, evaluate, and summarise the status of research in the ESG ratings, scoring and opinion considering the increasing relevance assumed by these issues and the challenges arising from it at an operational and regulatory level.

The paper uses the process indicated by the Prisma Statement to ensure the database construction is correct. Figure 4.1 graphically illustrates the data set extraction and processing mechanisms. So, the work constructed the sample under analysis by proceeding in stages.

First, the database to be queried is identified. Elsevier Scopus database, one of the most widely used databases in the bibliometrics studies literature (Fahimnia et al., 2015; Feng et al., 2017) was chosen because it offers broad coverage in terms of publishers and study topics, and thus the breadth of peer-reviewed articles.

Then the study proceeded to identify papers by searching for article titles, abstracts, and keywords, filtering by the following keywords: "ESG rating", "Environmental Social and Governance rating", "ESG score", "Environmental Social and Governance score", "ESG opinion*", "Environmental Social and Governance opinion*", and with the aim to observe also studies in banking and financial institutions, the keywords "bank*",

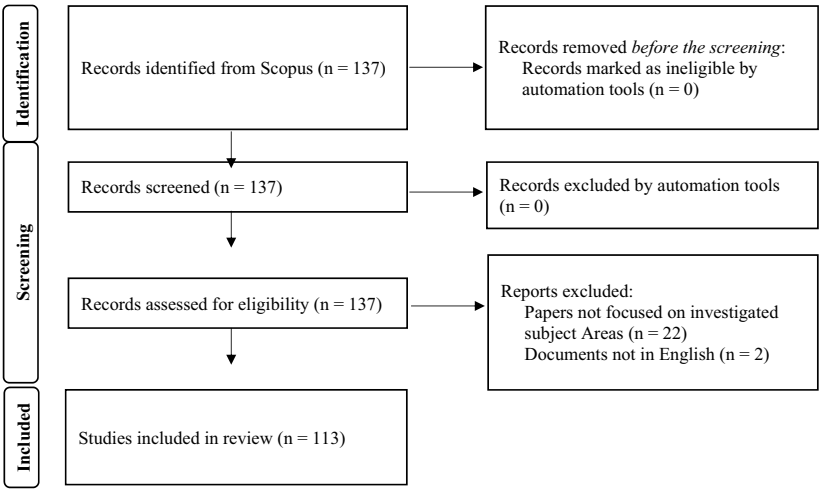

Fig. 4.1 Flowchart explaining the selection process

"financial intermediaries", "financial market", "financial institution*" were also used.

The search led to the identification of 137 documents, written in English and Russian, from 2013 to 2021, divided into Articles, Conference Papers, Reviews, Book Chapters, and Conference Reviews.

Finally, all articles not written in English (to ensure better understandability and quality of publications) and not investigating the Subject Areas were manually removed.

At the end of the procedure, the sample under analysis consisted of 113 papers.

The Bibliometric Analysis

The paper's empirical approach starts from a quantitative analysis of bibliometric citations on 113 articles on ESG rating, scoring and opinions. This step, after an initial depiction of the distribution of papers by year and by doctype, focuses on the "influence" of the contributions in the sample by differentiating by (a) Authors, (b) Country, (c) Journals, and (d) Articles and Topics.

Concerning the publications included in the sample, we note that 96% of them are articles (109), and the remaining 4% are distributed equally between book chapters (2) and reviews (2). As for the year of publication, Fig. 4.2 shows 90% of these have been published in the last three years, with a particular development of studies in 2021 (46%).

In this regard, one of the drivers that have probably addressed research on ESG ratings and assessments is the recent regulatory evolution. At the regulatory level, the EU legislator is proceeding towards a taxonomic effort mainly focused on sustainable finance, from which has derived greater attention also on the increase in disclosure levels of financial intermediaries and on the taxonomy of economic activities that can be considered ESG compliant. To limit the phenomena of information asymmetry related to instruments and issuers labelled as ESG—and given the absence at the time of harmonisation in methodologies—the High-Level Expert Group on Sustainable Finance (HLEG) of the European Commission already provided the Sustainable Rating Agencies with some important procedural recommendations in its Final Report (January 2018). Moreover, it is worth mentioning the European Taxonomy Regulation (Regulation EU 2020/852), and the Sustainable Finance Disclosure Regulation (Regulation EU 2019/2088) which aims

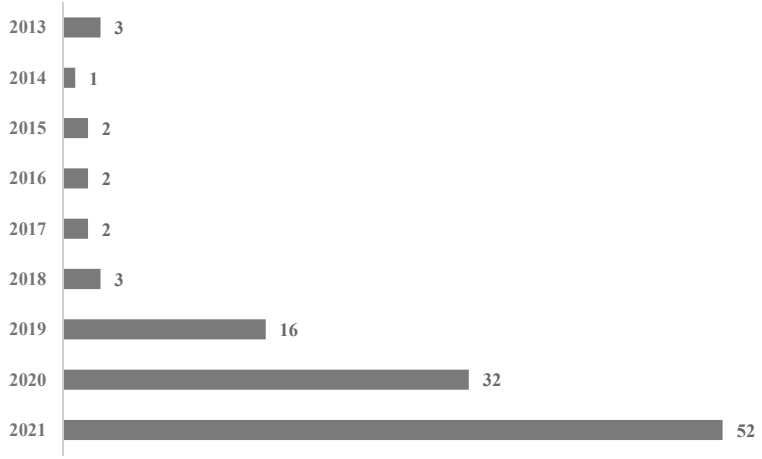

Fig. 4.2 Publications distribution by year

to increase disclosure levels on products and operational processes in the ESG sphere.

The paper identifies influential authors in the sample (Table 4.1) in terms of both the number of documents and citations. The analysis results show that the most influential authors have a small number of published papers. Most of them published two articles each, except Buallay, who published 5, and Lee, 3. On closer inspection, we notice that the most cited authors, Giannarakis and Sariannidis, have published on disclosure, while Escrig-Olmedo, Muñoz-Torres, and Rivera-Lirio have published on rating agencies. Buallay has published on sustainability reporting and performance.

More than half of the selected papers on ESG ratings, scores and opinions are from the European Union (88), with a particular contribution coming from some countries such as Italy (26), the United Kingdom (18), and Spain (13). Asian researchers also pay attention to the topics (42), while to a lesser extent (17), American researchers (Table 4.2). It is noteworthy that while Italy is the country with the highest number of papers, the articles with the most citations are Spanish, 135, followed by the Italians, 131, and Americans, 119.

The next step has been to analyse the Journals in which the papers have been published (Table 4.3). What is evident is that *Management Decision*, while presenting a small number of documents on the subject under analysis, has the highest number of citations, 131. As for *Corporate Social*

Table 4.1 Top ten influential authors by no. of papers and citations

Author(s)	*No. of papers*	*Citations*
Giannarakis G.	2	91
Sariannidis N.	2	
Escrig-Olmedo E.	2	77
Muñoz-Torres M.J.	2	
Rivera-Lirio J.M.	2	
Buallay A.	5	44
Fadel S.M.	2	28
Saudagaran S.	2	
Lee J.H.	3	19
Migliavacca M.	2	18
Mondéjar-Jiménez J.	2	
Peiró-Signes A.	2	
Segarra-oña M.	2	

Table 4.2 Distribution by country

Country	*State*	*No. of publications*	*Total of publications*	*Citations*
Africa	Tunisia	4	6	4
	Egypt	1		6
	Nigeria	1		16
America	United States	14	17	119
	Canada	2		25
	Colombia	1		8
Asia	India	8	42	39
	South Korea	6		36
	Bahrain	5		44
	China	4		27
	Turkey	4		25
	Malaysia	3		11
	Japan	2		5
	Pakistan	2		48
	Bangladesh	1		2
	Kuwait	1		21
	Lebanon	1		2
	Oman	1		0
	Saudi Arabia	1		0
	Singapore	1		5
	Taiwan	1		4
	United Arab Emirates	1		27
Australia	Australia	3	3	17
Europe	Italy	26	88	131
	United Kingdom	18		99
	Spain	13		135
	Germany	7		73
	France	4		31
	Netherlands	3		10
	Poland	3		13
	Greece	2		91
	Portugal	2		14
	Sweden	2		1
	Switzerland	2		12
	Czech Republic	1		1

(continued)

Table 4.2 (continued)

Country	*State*	*No. of publications*	*Total of publications*	*Citations*
	Denmark	1		2
	Iceland	1		0
	Liechtenstein	1		1
	Romania	1		3
	Russian Federation	1		11

Table 4.3 Top journals by no. of papers and citations

Journals	*No. of papers*	*Citations*	*Average citations*
Management decision	2	131	65.5
Corporate Social Responsibility and Environmental Management	14	123	8.8
Sustainability (Switzerland)	18	121	6.7
Review of financial economics	2	77	38.5
Journal of sustainable finance and investment	7	38	5.4
Business strategy and the environment	3	33	11
Review of financial studies	1	33	33
Energy policy	2	23	11.5
Annals of operations research	2	18	9
Social responsibility journal	2	18	9
International journal of environmental research	1	17	17
Cornell hospitality quarterly	1	16	16
Measuring business excellence	1	16	16
Review of quantitative finance and accounting	1	16	16

Responsibility and Environmental Management it ranks second with 123 citations but with a lower number of papers than *Sustainability* (Switzerland). The analysis also shows that Journals that have published the same number of papers as *Management Decision* have a much lower number of citations.

The search process for bibliometric analysis (Table 4.4) also revealed a focus on business, management and accounting, economics, econometrics

and finance publications. However, given the specific relevance individually assumed by the ESG components—and therefore of the individual evaluations overall expressed by ESG ratings—the topic is also explored in depth in the field of Social and Environmental Sciences and the field of Energy studies.

It is not surprising then that the trend topics in terms of keywords (Table 4.5) per average citation in the literature refer first to Sustainable Development, 184, Corporate Governance, 159, Firms and Financial Performance, 153 and 106, and Sustainability, 102.

Finally, our study includes a mapping analysis performed with Vosviewer, showing the clustering of articles with the exact keywords. The results are shown in Fig. 4.3 highlighting that the most recurring words in the field are: Corporate Governance, Corporate Strategy, Environment, Governance Approach, Performance Assessment, Risk-assessment, Stakeholder, Sustainability, Corporate Social Performance, Corporate Social Responsibility, CSR, ESG, ESG score, Financial Performance, Firm Performance, COVID-19, Environmental, ESG ratings, Firm Value, Social, Sustainable Development, ESG disclosure, Performance, Sustainability Reporting.

Table 4.4 Distribution by subject area

Subject Area	*No. of papers*
Business, Management and Accounting	70
Economics, Econometrics and Finance	53
Social Sciences	44
Environmental Science	43
Energy	21
Decision Sciences	6

Table 4.5 Trend topic in literature by average citations

Trend topics	*Average citations*
Sustainable Development	184
Corporate Governance	159
Firm Performance	153
Financial Performance	106
Sustainability	102

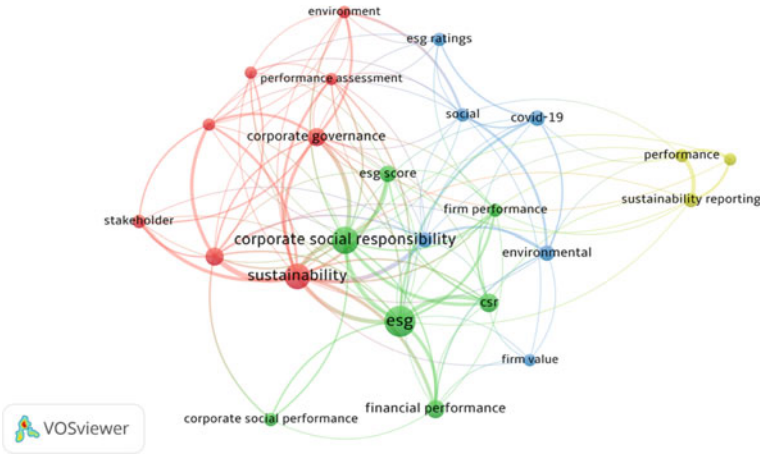

Fig. 4.3 Distribution by keywords

Keyword clustering (Fig. 4.4) shows a small number of papers focusing on ESG ratings, scoring, and opinion. In addition, the clustering shows how young the topic under analysis is, alluding to the fact that the most significant scientific production started in 2018 and has found an explosion in the last two years.

The results of the bibliometric survey are based on quantitative properties that are useful to better understand the nature of the research field; however, to also draw qualitative conclusions, it is necessary to conduct a qualitative analysis of the literature by organising the selected articles into clusters regarding contextual similarities related to keywords. Therefore, the systematic literature review is contained in the following section.

Systematic Analysis

The analysis of the selected literature highlights several research perspectives investigating the topic of ESG ratings, scores and other quantitative ESG assessments under different nuances.

The clusters were constructed according to the keywords associated with the individual papers.

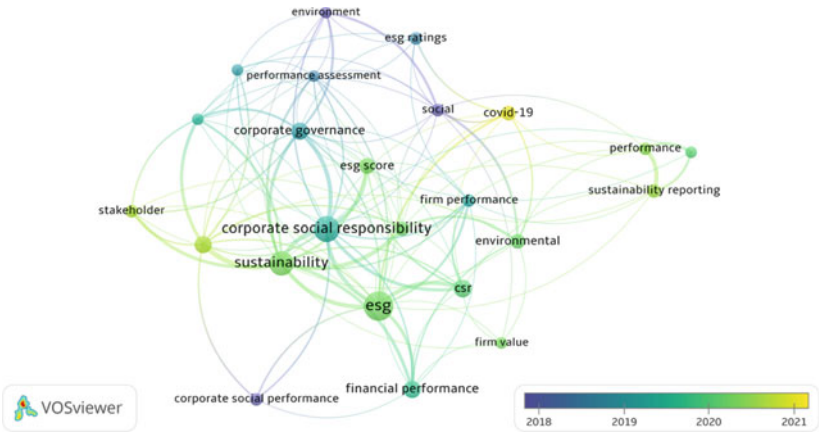

Fig. 4.4 Keywords distribution by year

As shown in Table 4.6 (Appendix A), some keywords are generic, and sometimes the same contributions recur in several clusters using several recurring keywords. However, the content is more inherent to one of them.

Therefore, in this phase of our study, we focused on analysing the keywords that are most relevant to our research purpose. As already stated, we aim to explore the level of in-depth analysis of the literature on ESG assessments, in its various forms, to verify which aspects have been most explored and which less, and thus to evaluate the emerging trends that provide significant evidence for ESG rating research, especially in terms of the methodological approaches used in ESG ratings.

In reviewing the selected papers, we find that the documents that properly focus on the nature and methodologies of ESG rating are a minority. Most studies use ESG factors as a proxy for evaluating various aspects of corporate performance; others, instead, assume ESG information as an element that integrates analyses of a more general nature on issues such as corporate governance or sustainability.

However, in carrying out the systematic literature review, we categorised papers according to their associated keywords. Nevertheless, for our study, it is helpful to track the contributions to three main lines of research.

Therefore, the following review analyses the papers following the order of schematisation of Table 4.6 (Appendix A) and tracing them to three main areas:

1. Studies that address broader issues by assessing their ESG implications;
2. Studies that use ESG information (usually ESG Scores) as a proxy for performance evaluations; and
3. Studies that specifically focus on the characteristics and methodologies of ESG rating processes.

Studies That Address Issues of a Broader Nature, Evaluating Their ESG Implications

Numerous materials classified within the cluster *ESG implications* can be conceptually referred to in this area. Most of the studies clustered under the keywords "corporate governance", "corporate strategy", "governance approach", "sustainability" use ESG information to investigate its relationship with corporate governance mechanisms, declining the different variables of corporate governance. Alternatively, these studies focus on the effects of disclosure of sustainability information by companies.

Concerning the first issue, several authors analyse the relationship between governance mechanisms and corporate social responsibility (CSR) disclosure: Ben Fatma and Chouaibi (2021) empirically examine the association between corporate governance mechanisms and the degree of CSR disclosure in European financial institutions. Analysing several corporate governance variables in 115 European financial institutions from 2007 to 2017, the authors find that these variables usually have positive associations with the degree of CSR disclosure.

Similar results (with specific regard to board independence, CEO duality, and sustainability committee) are found by Fahad—Rahman (2020) with a particular reference to Indian companies. In this case, however, the average age of board members and the female presence weakens CSR disclosure. The latter consideration is not found in most other studies: indeed, when referring to gender diversity in the board of directors, several studies agree on the positive role exerted by the presence of women in improving ESG disclosure, both at a general and specific

level (De Masi et al., 2021; Gangi et al., 2021; Ismail & Latiff, 2019; Nicolò et al., 2021). Similar results are found on the relationship between board characteristics, such as size and independence, and commitment to corporate social responsibility, confirming better sustainability scores (Muñoz, 2020; Shahbaz et al., 2020) and greater interest in developing environmental information (Bektur & Arzova, 2020; Giannarakis et al., 2020).

In addition to corporate governance variables, institutional factors may also influence the level of CSR disclosure (Coluccia et al., 2018), especially in the European context, in light of the increasing regulatory attention given to social and environmental responsibility of listed companies.

As for governance policies, the study by Giannarakis et al. (2014), in the US context, highlights how some specific choices—including emissions reduction initiatives—positively influence ESG scores.

Instead, some authors focus on the quality of disclosure of non-financial strategies, assessing how they affect ESG scores (Santamaria et al., 2021) and on the relationship between company risk and transparency level of sustainability reporting (Czerwińska & Kaźmierkiewicz, 2015; Danisch, 2021; Lueg & Lueg, 2020; Tamimi & Sebastianelli, 2017).

In this context, the need for greater harmonisation of mandatory disclosures and comparability of financial ESG disclosure accounting profiles also emerges (Faccia et al., 2021).

Studies That Use ESG Information as a Proxy for Performance Evaluations

The content analysis of our selection highlighted that ESG Rating, scores, and other quantitative ESG assessments are often approached in a practical way to perform analyses. Thus, several authors in our sample—especially those in the cluster *ESG as a proxy*—use ESG scores for performance assessments.

Studies that focus on corporate social performance (Bahadori et al., 2021; Halbritter & Dorfleitner, 2015) do not find a precise match in results. For example, the study carried out by Daszyńska-żygadło et al. (2021) used ESG Scores' Refinitiv database as a proxy for CSP for banks worldwide over the period 2009–2016 to assess how CSP affects the

market value and earnings capabilities of companies from the banking industry. The authors remark that environmental and social performance harms banks' CSP, while governance performance has a positive impact. In contrast, Adegbite et al. (2019)—who also use ESG scores to assess corporate social performance—suggest that UK-listed firms, over the period 2002–2015, periodically adjust their level of commitment to meet their CSP target.

Another set of studies instead uses ESG assessments as a proxy for corporate social responsibility (Fabozzi et al., 2021; Lee et al., 2018; Naseem et al., 2020) to investigate their impact on corporate financial performance, finding mixed results.

Tasnia et al. (2020), on the other hand, consider ESG scores as a proxy for CSR, aiming to investigate the effect of CSR on stock price volatility of a sample of 37 U.S. banks from 2013 to 2017. The authors find a significant and positive relationship between CSR and stock price volatility, suggesting that U.S. bank shareholders dislike an over-focus on CSR because of the additional investment cost associated with CSR implementation.

In contrast, Paltrinieri et al. (2020) focus on the effects of CSR from the perspective of the relationship between the growing role played by Islamic finance, its connection to sustainability, and the drivers of that relationship. Based on a sample of 224 banks from sixteen emerging and advanced countries during 2014–2017, the authors assess the extent to which the development of Islamic financial markets is related to banks' sustainability strategies. The results show a positive relationship between the Islamic Finance Development Indicator (IFDI) and ESG scores.

Other studies examine the relation between ESG factors and corporate financial performance by relating environmental, social, and governance evaluations to financial performance (Ahmed et al., 2019; Chouaibi et al., 2021). For example, the study by La Torre et al. (2021) considers European banks listed in the STOXX Europe 600 between 2008 and 2019 and verifies the relationship between ESG Performance and CFP considering simultaneously different dimensions of financial performance; the results show a positive and statistically significant relationship between the ESG Performance and Value-Based Measurements and no ties with accounted-based performance.

Finally, some authors consider ESG assessments to analyse market reactions (Bae et al., 2021). This group includes the study by Shanaev and Ghimire (2021) that evaluates the effects of ESG rating changes on stock returns, investigating the impact of 748 ESG rating updates on stock returns of US companies over the period 2016–2021. The results show that ESG rating upgrades lead to positive but insignificant abnormal returns, while downgrades are detrimental to stock performance. Demers et al. (2021) disagree that ESG scores are good predictors of stock price resilience, particularly during the COVID-19 crisis. Indeed, the connection between ESG ratings and stock performance during the COVID-19 crisis has been analysed by several authors, but their findings are not always convergent (Chen & Yang, 2020; Filbeck et al., 2021; Lööf et al., 2021). According to the study by Engelhardt et al. (2021)—investigating the relationship between ESG ratings and stock performance of European firms during the COVID-19 crisis—firms with high ESG ratings are associated with higher abnormal returns lower stock volatility. Takahashi and Yamada's (2021) analysis of the Japanese stock market during the COVID-19 pandemic concludes that there is no evidence that firms with high ESG scores have higher abnormal returns.

Studies That Specifically Focus on ESG Rating Characteristics and Methodologies

In light of the above, it emerges that ESG ratings, scores, and other quantitative ESG assessments can measure different aspects. The extensive literature on the above areas seems to confirm our initial assumption, i.e., that the existing literature tends to focus on specific issues while leaving some areas of inquiry unaddressed: namely, it seems that there are no clear distinctions in terms of methodologies and definitions related to ESG Rating.

As for the specific aim of our analysis (i.e., to highlight emerging trends that offer significant evidence for ESG rating research, although they are less investigated), it is crucial to focus on contributions that analyse the heterogeneity of ESG rating outcomes, highlighting the different methodologies adopted by ESG rating providers.

However, the systematic review of the selected literature confirms the initial hypotheses. There are relatively few contributions that specifically deal with ESG assessments to evaluate the methodological aspects and the differences between ratings, scores, and opinions.

Our selection found that some studies that focus on the different methodologies used by providers can be traced back to this group. Still, there is no clear distinction between the different types of ESG evaluations. Authors broadly agree that there is a lack of correspondence between the ESG ratings given by various providers. Specifically, Hughes et al. (2021) compare a set of traditional ratings sourced from MSCI ESG with a group of artificial intelligence-based alternative ESG ratings sourced from Truvalue Labs. The paper shows a poor match between conventional and alternative ESG ratings. In more detail, the authors show that differences in ratings are driven by a few main factors: differences in the selection of critical issues, differences in the sources of data analysed and differences in weighting structures for rating aggregation. Escrig-Olmedo et al. (2019) also perform a comparative descriptive analysis. Still, they focus on the public information provided by ESG rating agencies and their criteria, highlighting their evolution over the period 2008–2018. The authors give an account of the progressive development of ESG rating agency assessment models over time; however, they observe that these assessments, to date, do not fully integrate sustainability principles into the corporate sustainability assessment process. Similarly, Muñoz-Torres et al. (2019)—who conducted exploratory research on the assessment criteria adopted by eight ESG agencies—argue that ESG rating agencies do not yet integrate ESG criteria holistically. In addition, according to Stubbs and Rogers' study (2013), greater transparency about the methodologies used by ESG rating agencies would be appropriate. The paper conducts a case study on an Australian ESG rating agency, Regnan. According to the authors, subjectivity is inevitable in ESG ratings. The demand for uniformity may inhibit innovation, but further research would be needed to understand what combination of uniformity and transparency is sufficient to meet stakeholder requirements for ESG information. Along the same lines of research is the paper by Billio et al. (2021), which analyses the ESG rating criteria used by central agencies. The analysis shows a lack of commonality in the definition of ESG (i) characteristics (ii) attributes, and (iii) standards in the definition of the E, S, and G components. This leads to implications for the heterogeneity of opinions assigned to the same rated firms, as there is substantially low agreement among these providers. Similar conclusions are reached in the analysis of Gyönyörová et al. (2021), which finds that the consistency of ESG assessments is significantly dependent on industry type and country. According to this perspective, the use of ESG

assessments without considering the mentioned elements could provide a misleading indication.

Thus, studies in this area tend to agree on the heterogeneity of ESG evaluations, but there remains some unclear distinction among ratings, scoring and opinions. This leads to multidimensionality of information, with implications related to disclosure profiles and the overall quality of ESG information.

In light of the above, there is a need to expand empirical research to contribute to the development of a common methodological approach to be used by ESG rating providers.

Conclusion

This study aimed to analyse the state of the art of scientific literature on ESG rating, scoring, and opinion. The analysis was carried out using both bibliometric and systematic literature reviews. The selected sample consisted of 113 papers published between 2013 and 2021; this sample was structured using the inclusion and exclusion approaches most widely used in the literature.

The bibliometric analysis showed an increasing interest in the literature on ESG topics from 2019 onwards, especially driven by European and Italian scholars. Regarding the main thematic areas, we found that the most populated areas are Business, Management and Accounting, Economics, Econometrics and, to some extent, Finance.

The clustering process of the main survey perspectives showed that they can be traced back to 4 clusters that we named: "ESG Implications", "ESG as a Proxy", "ESG Rating Process", and "ESG Reporting & Opinion".

The systematic analysis of the contents grouped by keywords showed a high population of the first two clusters. These can be traced to studies: (a) addressing broader issues by assessing their ESG implications, and (b) using ESG information (usually ESG scores) as a proxy for performance assessments.

With regard to the focus of our analysis, i.e., studies on ESG ratings, scoring and assessment methodologies, we found that contributions that specifically address the issue of ESG assessments to capture their methodological differences and the differences between ratings, scores and opinions are relatively few.

Our systematic literature review, therefore, confirmed our initial hypothesis that, while the existing literature tends to focus on specific issues, it leaves some areas of inquiry unresolved.

Specifically, our results indicate, first, a lack of clear demarcation between the different methodologies and definitions used to assign ESG ratings and scores. The implications of this lack of harmonisation in methodologies and evaluations relate to disclosure profiles and the use of information by investors.

Secondly, our analysis has shown that—although ESG issues play an essential and rising role for the financial sector, on a general level—there are still rather few studies that explicitly focus on the effects of ESG profiles from a purely banking and financial point of view.

In fact, we have noticed that only about a third of the studies in our selection are expressly dedicated to the analysis of ESG aspects with respect to banks and financial intermediaries. These are studies that, almost entirely through empirical analysis, use ESG indicators (mainly ESG scores) to explore implications of specific concern for the banking sector and to investigate the ESG attitudes of banks and intermediaries.

In light of the above, our systematic literature review contributes to studies in this field by highlighting, on the one hand, the plurality of methodological approaches by ESG rating providers and, on the other hand, a lack of studies aimed at investigating the specific implications of the relationships between ESG issues and management processes for the banking sector.

Hence, there is a clear need to broaden the empirical base of research to have a solid basis for developing a theoretical model capable of supporting the plurality of approaches in a holistic view, which is of particular relevance for the financial sector.

Appendix A

See Table 4.6.

Table 4.6 Clusterisation of studies on/using ESG rating, scoring and opinion

Cluster	*Keywords*	*Author(s)*	*Year*
ESG implications	Corporate governance	Ben Fatma H., Chouaibi J. Castillo-Merino D., Rodríguez-Pérez G. De Masi S., Słomka-Gołębiowska A., Becagli C., Paci A. Nicolò G., Zampone G., Sannino G., De Iorio S.	2021
		Giannarakis G., Andronikidis A., Sariannidis N. Fahad P., Rahman P.M. Muñoz F.	2020
		Brogi M., Lagasio V. Yoon B., Lee J.-H.	2019
		Giannarakis G., Konteos G., Sariannidis N.	2014
		Peiró-Signes A., Segarra-Oña M., Mondéjar-Jiménez J., Vargas-Vargas M.	2013
	Corporate strategy	Aslan A., Poppe L., Posch P. Castillo-Merino D., Rodríguez-Pérez G. De Masi S., Słomka-Gołębiowska A., Becagli C., Paci A. Ruan L., Liu H.	2021
		Peiró-Signes A., Segarra-Oña M., Mondéjar-Jiménez J., Vargas-Vargas M.	2013
	Environment	Giannarakis G., Andronikidis A., Sariannidis N. Lueg K., Lueg R.	2020
		Yoon B., Lee J.-H.	2019
		Peiró-Signes A., Segarra-Oña M., Mondéjar-Jiménez J., Vargas-Vargas M. Rees W., Rodionova T.	2013

Cluster	*Keywords*	*Author(s)*	*Year*
	Governance approach	Aslan A., Poppe L., Posch P.	2021
		Castillo-Merino D., Rodríguez-Pérez G.	
		Santamaria R., Paolone F., Cucari N., Dezi L.	
		De Masi S., Słomka-Gołębiowska A., Becagli C., Paci A.	
		Hughes A., urban M.A., Wójcik D.	
		Ruan L., Liu H.	
		Ielasi F., Ceccherini P., Zito P.	2020
		La Torre M., Mango F., Cafaro A., Leo S.	
		Crespi F., Migliavacca M.	
		Chiaramonte L., Dreassi A., Paltrinieri A., Piserà S.	
		García F., González-Bueno J., Guijarro F., Oliver J.	
	Performance assessment	Yoon B.-H., Lee J.-H., Cho J.-H.	2021
		La Torre M., Mango F., Cafaro A., Leo S.	2020
		Rajesh R., Rajendran C.	
		Durán-Santomil P., Otero-González L.,	2019
		Correia-Domingues R.H., Reboredo J.C.	
		Peiró-Signes A., Segarra-Oña M., Mondéjar-Jiménez J.,	2013
		Vargas-Vargas M.	
	Risk-assessment	Ruan L., Liu H.	2021
		Ielasi F., Ceccherini P., Zito P.	2020
		Lueg K., Lueg R.	
		Durán-Santomil P., Otero-González L.,	2019
		Correia-Domingues R.H., Reboredo J.C.	
		Czerwińska T., Kaźmierkiewicz P.	2015

(continued)

Table 4.6 (continued)

Cluster	*Keywords*	*Author(s)*	*Year*
	Stakeholder	Faccia A., Manni F., Capitanio F.	2021
		Castillo-Merino D., Rodríguez-Pérez G.	
		De Masi S., Słomka-Gołębiowska A., Becagli C., Paci A.	
		Signori S., San-Jose L., Retolaza J.L., Rusconi G.	
		Ruiz-Blanco S., Romero S., Fernandez-Feijoo B.	
		Coluccia D., Fontana S., Solimene S.	2018
	Sustainability	Bansal M., Samad T.A., Bashir H.A.	2021
		Faccia A., Manni F., Capitanio F.	
		Aslan A., Poppe L., Posch P.	
		Castillo-Merino D., Rodríguez-Pérez G.	
		De Masi S., Słomka-Gołębiowska A., Becagli C., Paci A.	
		Patel P.C., Pearce J.A., II, Oghazi P.	
		Hughes A., Urban M.A., Wójcik D.	
		Barros V., Falcão P.F., Sarmento J.M.	
		Abdi Y., Li X., Càmara-Turull X.	
		Ruiz-Blanco S., Romero S., Fernandez-Feijoo B.	
		Yilmaz I.	

Cluster	*Keywords*	*Author(s)*	*Year*
		Giannarakis G., Andronikidis A., Sariannidis N.	2020
		Varyash I., Mikhaylov A., Moiseev N., Aleshin K.	
		La Torre M., Mango F., Cafaro A., Leo S.	
		Shahbaz M., Karaman A.S., Kilic M., Uyar A.	
		Chiaramonte L., Dreassi A., Paltrinieri A., Piserà S.	
		Liang H., Renneboog L.	
		Rajesh R., Rajendran C.	
		Durán-Santomil P., Otero-González L.,	2019
		Correia-Domingues R.H., Reboredo J.C.	
		Bodhanwala S., Bodhanwala R.	
		Escrig-Olmedo E., Fernández-Izquierdo M.,	
		Ferrero-Ferrero I., Rivera-Lirio J.M., Muñoz-Torres M.J.	
		Tamimi N., Sebastianelli R.	
ESG as a proxy	Corporate social performance	Daszyńska-żygadło K., Słoński T., Dziadkowiec A.	2021
		Crespi F., Migliavacca M.	2020
		García F., González-Bueno J., Guijarro F., Oliver J.	
		Adegbite E., Guney Y., Kwabi F., Tahir S.	2019
		Halbritter G., Dorfleitner G.	2015
		Stubbs W., Rogers P.	2013

(continued)

Table 4.6 (continued)

Cluster	*Keywords*	*Author(s)*	*Year*
	Corporate social responsibility	Ben Fatma H., Chouaibi J.	2021
		Bae J., Yang X., Kim M.-I.	
		Billio M., Costola M., Hristova I., Latino C., Pelizzon L.	
		Aslan A., Poppe L., Posch P.	
		Yoon B.-H., Lee J.-H., Cho J.-H.	
		Fabozzi F.J., Ng P.W., Tunaru D.E.	
		Demers E., Hendrikse J., Joos P., Lev B.	
		Nicolò G., Zampone G., Sannino G., De Iorio S.	
		Di Tommaso C., Thornton J.	2020
		Crespi F., Migliavacca M.	
		Shahbaz M., Karaman A.S., Kilic M., Uyar A.	
		Liang H., Renneboog L.	
		Bodhanwala S., Bodhanwala R.	
		Naseem T., Shahzad F., Asim G.A., Rehman I.U., Nawaz F.	
		Durán-Santomil P., Otero-González L.,	2019
		Correia-Domingues R.H., Reboredo J.C.	
		Utz S.	
		Adegbite E., Guney Y., Kwabi F., Tahir S.	
		Bodhanwala S., Bodhanwala R.	
		Yoon B., Lee J.-H.	
		Coluccia D., Fontana S., Solimene S.	2018
		Lee J.-H., Kang Y.-S., Kim S.-S.	
		Kim Y., Kim M., Mattila A.S.	2017
		Giannarakis G., Konteos G., Sariannidis N.	2014
		Rees W., Rodionova T.	2013
	CSR	Engelhardt N., Ekkenga J., Posch P.	2021

Cluster	*Keywords*	*Author(s)*	*Year*
		Yoon B.-H., Lee J.-H., Cho J.-H.	
		Danisch C.	
		Gangi F., Daniele L.M., Varrone N., Vicentini F., Coscia M.	
		Murè P., Spallone M., Mango F., Marzioni S., Bittucci L.	
		Shahbaz M., Karaman A.S., Kilic M., Uyar A.	2020
		Gao Y., Han K.-S.	
		Tasnia M., Syed Jaafar AlHabshi S.M., Rosman R.	
		Paltrinieri A., Dreassi A., Migliavacca M., Piserà S.	
		Brogi M., Lagasio V.	2019
		Bodhanwala S., Bodhanwala R.	
		Kim Y., Kim M., Mattila A.S.	2017

(continued)

Table 4.6 (continued)

Cluster	*Keywords*	*Author(s)*	*Year*
	ESG	Bae J., Yang X., Kim M.-I. D'Apice V., Ferri G., Intonti M. Yoon B.-H., Lee J.-H., Cho J.-H. Demers E., Hendrikse J., Joos P., Lev B. Takahashi H., Yamada K. Daszyńska-żygadło K., Słoński T., Dziadkowiec A. Signori S., San-Jose L., Retolaza J.L., Rusconi G. Lööf H., Sahamkhadam M., Stephan A. Filbeck G., Robbins E., Zhao X. Barros V., Falcão P.F., Sarmento J.M. Buallay A., El Khoury R., Hamdan A. Shanaev S., Ghimire B. Behl A., Kumari P.S.R., Makhija H., Sharma D. Gyönyörová L., Stachoň M., Stašek D. Bahadori N., Kaymak T., Seraj M. La Torre M., Leo S., Panetta I.C.	2021

Cluster	*Keywords*	*Author(s)*	*Year*
		Ielasi F., Ceccherini P., Zito P.	2020
		Chen H.-Y., Yang S.S.	
		Varyash I., Mikhaylov A., Moiseev N., Aleshin K.	
		La Torre M., Mango F., Cafaro A., Leo S.	
		Shahbaz M., Karaman A.S., Kilic M., Uyar A.	
		Liang H., Renneboog L.	
		Tasnia M., Syed Jaafar AlHabshi S.M., Rosman R.	
		Schmidt A.B.	
		P F., K.B. N.	
		Paltrinieri A., Dreassi A., Migliavacca M., Piserà S.	
		Conway E.	2019
		Kaiser L., Welters J.	
		Buallay A.	
		Aboud A., Diab A.	
		Brogi M., Lagasio V.	
		Halbritter G., Dorfleitner G.	2015
	ESG score	Bansal M., Samad T.A., Bashir H.A.	2021
		Santamaria R., Paolone F., Cucari N., Dezi L.	
		Martínez-Ferrero J., Lozano M.B., Vivas M.	
		La Torre M., Leo S., Panetta I.C.	
		Murè P., Spallone M., Mango F., Marzioni S., Bittucci L.	
		Di Tommaso C., Thornton J.	2020
		Durán-Santomil P., Otero-González L.,	2019
		Correia-Domingues R.H., Reboredo J.C.	
		Bodhanwala S., Bodhanwala R.	
		Yoon B., Lee J.-H.	

(continued)

Table 4.6 (continued)

Cluster	*Keywords*	*Author(s)*	*Year*
	Financial performance	Patel P.C., Pearce J.A., II, Oghazi P. Abdi Y., Li X., Càmara-Turull X. Bahadori N., Kaymak T., Seraj M. Yilmaz I. Chouaibi S., Chouaibi J., Rossi M.	2021
		Shahbaz M., Karaman A.S., Kilic M., Uyar A. Muñoz F.	2020
		Conway E. Ahmed S.P., Ahmed S.U., Noor M.F., Ahmed Z., Karmaker U.	2019
		Lee J.-H., Kang Y.-S., Kim S.-S.	2018
		Halbritter G., Dorfleitner G.	2015
	Firm performance	Bansal M., Samad T.A., Bashir H.A.	2021
		Shahbaz M., Karaman A.S., Kilic M., Uyar A. Naseem T., Shahzad F., Asim G.A., Rehman I.U., Nawaz F.	2020
		Aboud A., Diab A. Brogi M., Lagasio V.	2019
		Segarra-Oña M., Peiró-Signes A., Mondéjar-Jiménez J., Sáez-Martínez F.J.	2016
ESG rating processes	COVID-19	Demir E., Danisman G.O. Yoo S., Keeley A.R., Managi S. Engelhardt N., Ekkenga J., Posch P. Demers E., Hendrikse J., Joos P., Lev B. Takahashi H., Yamada K. Filbeck G., Robbins E., Zhao X. Díaz V., Ibrushi D., Zhao J.	2021

Cluster	*Keywords*	*Author(s)*	*Year*
		Folger-Laronde Z., Pashang S., Feor L., ElAlfy A.	2020
	Environmental	Demir E., Danisman G.O.	2021
		Yoo S., Keeley A.R., Managi S.	
		Hughes A., Urban M.A., Wójcik D.	
		Chouaibi S., Chouaibi J., Rossi M.	
		Bektur Ç., Arzova S.B.	2020
		Ismail A.M., Latiff I.H.M.	2019
		Muñoz-Torres M.J., Fernández-Izquierdo M.Á., Rivera-Lirio J.M., Escrig-Olmedo E.	
		Ahmed S.P., Ahmed S.U., Noor M.F., Ahmed Z., Karmaker U.	
	ESG ratings	Abate G., Basile I., Ferrari P.	2021
		Prajapati D., Paul D., Malik S., Mishra D.K.	
		Díaz V., Ibrushi D., Zhao J.	
		Folger-Laronde Z., Pashang S., Feor L., ElAlfy A.	2020
		Segarra-Oña M., Peiró-Signes A., Mondéjar-Jiménez J., Sáez-Martínez F.J.	2016
		Peiró-Signes A., Segarra-Oña M., Mondéjar-Jiménez J., Vargas-Vargas M.	2013
	Firm value	Abdi Y., Li X., Càmara-Turull X.	2021
		Behl A., Kumari P.S.R., Makhija H., Sharma D.	
		Gao Y., Han K.-S.	2020
		Bektur Ç., Arzova S.B.	
		Ionescu G.H., Firoiu D., Pirvu R., Vilag R.D.	2019
	Social	Demir E., Danisman G.O.	2021
		Yoo S., Keeley A.R., Managi S.	

(continued)

Table 4.6 (continued)

Cluster	*Keywords*	*Author(s)*	*Year*
		Lueg K., Lueg R. Bektur Ç., Arzova S.B.	2020
		Peiró-Signes A., Segarra-Oña M., Mondéjar-Jiménez J., Vargas-Vargas M. Rees W., Rodionova T.	2013
	Sustainable development	Yoo S., Keeley A.R., Managi S. De Masi S., Słomka-Gołębiowska A., Becagli C., Paci A. Hughes A., Urban M.A., Wójcik D.	2021
		Shahbaz M., Karaman A.S., Kilic M., Uyar A. Rajesh R., Rajendran C.	2020
		Muñoz-Torres M.J., Fernández-Izquierdo M.Á., Rivera-Lirio J.M., Escrig-Olmedo E. Escrig-Olmedo E., Fernández-Izquierdo M., Ferrero-Ferrero I., Rivera-Lirio J.M., Muñoz-Torres M.J.	2019
ESG reporting and disclosure	ESG disclosure	Nicolò G., Zampone G., Sannino G., De Iorio S.	2021
		Buallay A., Fadel S.M., Al-Ajmi J.Y., Saudagaran S. Kee H.W., Li N.S., Sidik V.N.M., Seng N.F., Suppiah S.D.K.	2020
		Buallay A., Fadel S.M., Alajmi J., Saudagaran S. Buallay A.	2019
	Performance	Yoo S., Keeley A.R., Managi S. Buallay A., El Khoury R., Hamdan A. Buallay A., Al-Ajmi J., Barone E.	2021

Cluster	*Keywords*	*Author(s)*	*Year*
		Buallay A., Fadel S.M., Al-Ajmi J.Y., Saudagaran S.	2020
		Buallay A.	2019
	Sustainability reporting	Bansal M., Samad T.A., Bashir H.A.	2021
		Danisch C.	
		Buallay A., El Khoury R., Hamdan A.	
		Buallay A., Al-Ajmi J., Barone E.	
		Buallay A., Fadel S.M., Al-Ajmi J.Y., Saudagaran S.	2020
		Buallay A.	2019

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PART II

Performance

CHAPTER 5

Corporate Financial Performance and ESG Performance: Which One Leads European Banks?

Mario La Torre, Sabrina Leo, and Ida Claudia Panetta

Introduction

A growing strand of literature on banking business models has diverted on Environmental, Social and Governance (ESG) issue to orient managers in their decision-making processes (Galbreath, 2013). In banking, managers appear pressured by shareholders and different stakeholders (Houston & Shan, 2019) to incorporate the ESG issue into practically every area, particularly for lending processes.

The shareholders, as known, are more interested in those ESG practices that can increase their financial wealth (Friedman, 1962), while

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the stakeholder (e.g., consumers, investors, businesses, employees, and governments) are moved from a variety of instances regarding ESG issues.

Among the stakeholders, policymakers and international institutions rely on the leading role of banks in the development of countries due to their role as investment project selectors and risk managers (Beck et al., 2010). The underlying assumption is that if banks were willing to change their investment strategies encompassing ESG factors, sustainable growth could be feasible (EBA, 2020). Regulators and supervisors at the EU level have designed a precise roadmap (EBA, 2020; EC, 2018; ECB, 2020) to force the banks to embed ESG factors in their operations and plans (e.g., risk appetite framework 2023).

Following the recent financial crisis, banks are re-inventing themselves under the banner of sustainability, capitalising on stakeholders' rising interest in environmentally and socially responsible activities (Carroll & Schwartz, 2003) and implementing good governance processes (Cucari et al., 2018; Widyawati, 2020). While the immediate advantages of incorporating ESG principles into bank initiatives may be less noticeable (compared to other industries), the long-term benefits may be just as significant. Banks can fund more resilient projects and businesses with more predictable profitability by choosing investments that integrate ESG criteria in the selection process (Ioannou & Serafeim, 2019). This investment class is praised for its ability to connect long-term economic, social and environmental performance goals (OECD, 2020).

Incorporating social goals into internal operations can also result in cost savings and efficiency gains. Furthermore, Serafeim (2020) claims that paying attention to ESG concerns aids management in lowering the cost of capital (Dhaliwal et al., 2011) and expanding the shareholder base.

In light of the previous, it is critical to determine if banks can find good impulses to be ESG-oriented on their own or whether governmental prescriptions must be used to "push" them.

This research intends to explore banks' motivation to engage in voluntary ESG practises by searching for evidence of a positive association between Environmental, Social, and Governance Performance (ESGP) and Corporate Financial Performance (CFP).

Even though the link between ESGP and company CFP has been studied in several prior research utilising various ESG dimensions and performance indicators, as indicated by a large number of literature reviews on the issue (Arceiz et al., 2018; Busch & Friede, 2018; Hou et al., 2016; López-Wang et al., 2016; Lu & Taylor, 2016; Revelli &

Viviani, 2015; Rost & Ehrmann, 2017; del Mar Miras-Rodríguez et al., 2015), the banking system is the subject of only a few studies (Buallay, 2019; Buallay et al., 2019, 2020; Cornett et al., 2016; Forgione et al., 2020; Miralles-Quirós et al., 2018, 2019a, 2019b; Nizam et al., 2019; Shakil et al., 2019). According to Finger et al. (2018), this is due to bank idiosyncrasies, which lead to their functioning under a common regulation, which forces them to follow established accounting and reporting norms. Banks are generally excluded from research using multi-sector samples because of these idiosyncrasies and process specificities and sometimes standardised and opaque information (Miralles-Quirós et al., 2019b).

We looked at the banks listed in Europe between 2008 and 2020, including 21 European nations. Unlike our prior study, we employed the single Pillar Score (E, S, G) as a proxy for ESGP and CFP metrics (both account-based and market-based) and value creation indicators to validate the presence of the association mentioned above. In our panel regression models, we employed the variables we chose.

Our findings enable us to better understand banks' attitudes on implementing ESG practises and determine if CFP and value creation motivate banks to be ESG-oriented or whether regulation and/or market pressure are required. Furthermore, the study adds to the growing body of literature examining the link between ESGP and bank CFP.

The following was the format of the chapter: The research question was created in section 'Background and Research Question Definition' based on the source literature. Part III described the study's methodology; in section 'Conclusions', it displayed the research findings, analysed them and then offered some conclusions.

Background and Research Question Definition

Scholars have paid particular attention to ESG performance since the idea was first proposed (UN Global Compact, 2004). First, ESG aspects are used in Corporate Social Responsibility (CSR) studies to study the impact of socially responsible behaviour chosen voluntarily by management on profitability and value creation. Second, ESG metrics are used as a proxy for the investment approach that blends ESG concerns with financial objectives into investment decision-making in Social and Responsible Investing (SRI) (Renneboog et al., 2008). There is a plethora of literature that details the evolution of CSR and ESG and the concerns that they

raise (Carroll, 2008; Huang, 2019; Montiel & Delgado-Ceballos, 2014; Sheehy, 2015). Stakeholder theory (Freeman, 1984; Jones, 1995) underpins CSR, which entails identifying a firm's stakeholders and integrating their interests into its profit-maximising objectives. Different researchers have sought to explain how crucial it is to fulfil shareholder and stakeholder expectations to produce value, starting with stakeholder theory and progressing via a CSR framework and CG best practices. Although shareholders share financial prosperity (Friedman, 1962), the stakeholders (workers, consumers, and local communities) are the ultimate bearers of risk in terms of social consequence (Freeman & Liedtka, 1991). The ESG may be used in several ways. Since it outlines three key typologies of stakeholder-firm relationships environmental, social and governance (Hassel & Semenova, 2013), the ESG may be considered the evolution of the notion of CSR (Aguinis, 2011) and, in this way, seen as the current "concept" of social responsibility (Barnett, 2007; Carroll, 1991; Clarkson, 1995; Donaldson & Preston, 1995; Wood, 1991). By embracing this approach, the ESGP becomes a tool for fulfilling stakeholders' needs in terms of ESG initiatives and equipping them with the knowledge they need to assess business operations. ESG performance, according to stakeholder theorists and proponents of the "doing-good-while-doing-well" hypothesis (Kramer & Porter, 2011), leads to higher profits and market value by ensuring: (i) lower direct costs (e.g., potential penalties and taxes); (ii) greater operational efficiency (Brammer & Millington, 2005; Porter & Kramer, 2002); (iii) increased employee productivity and a broader consumer base (Mar (Lundgren & Marklund, 2015; Porter & Van der Linde, 1995). Going by that logic, as firms' CSR activities contribute to the distribution of results to shareholders and other stakeholders, aiding long-term company growth and financial success, ESGPs are inextricably linked to CFP (Shirasu & Kawakita, 2020).

Banks, like other companies, are urged to include ESG aspects to improve micro and macro performance. However, unlike other industries, banks place a greater emphasis on ESG variables, which influence both the asset and liability side and the allocation process (direct investment and credit supply).

Under this premise, we believe that verifying the existence of a positive relationship between ESGP and CFP, capable of directing management towards ESG, is particularly important in the banking sector, given the

widespread impact of bank conduct in society (Beck et al., 2010; Miralles-Quirós et al., 2019b). Therefore, considering that ESGPs are a measure of management's voluntary integration of ESG considerations in business models, our research issue is: *Do bank executives find adequate market stimuli (CFP are high enough) to be spontaneously ESG-oriented?* In the event of negative findings, governments may find reasons to compel them through a combination of incentives and laws designed to encourage banks to engage in ESG behaviour.

Whereas the research strand focused on the link between "sustainability dimensions" and CFP is pretty recent and populated by a large number of outstanding contributions, those looking at ESG facets in the banking sector and their impact on value creation are far fewer and more contemporaneous. According to Wu and Shen (2013), early studies on CSR and CFP in the banking sector (Chih et al., 2010; De la Cuesta-González et al., 2006; Scholtens, 2009; Scholtens & Dam, 2007; Simpson & Kohers, 2002) focused on the engagement of CSR activities or financial performance not strictly related to the pursuit of CSR issues, resulting in little empirical evidence of the link between CSR and CFP in the banking sector.

ESG research in banking is relatively new. The belated attention given by banks to ESG concerns, which began with the current financial crisis, is primarily justified by managers' attitudes towards ESG components to avoid reputational risk. ESG problems have only recently been linked to improved economic success (Barnea & Rubin, 2010; Cespa & Cestone, 2007; Klettner et al., 2014). The banking industry has also recently been subjected to "ESG regulatory pressure". Since the unanimously and legally ratified Paris Agreement on Climate Change in December 2015, research that appears to be more specifically focused on the ESGP-CFP link in the banking industry has begun to accelerate (Table 5.1). As part of their obligation to behave in their customers' best interests, financial market players and financial advisers should integrate ESG risks and opportunities into their procedures, as stated by the Paris climate accord.

Recent ESG assessments of the banking system have found disparities in outcomes compared to other sectors (Table 5.1, studies highlighted with *). Only around 40% of research focused on the banking industry between 2015 and 2020, and most of them produced contradictory outcomes. Only a few studies (Buallay et al., 2020; Cornett et al., 2016; Nizam et al., 2019) found a generalised positive relationship in the banking sector, while others found negative (Forgione et al., 2020) or

Table 5.1 Studies on the ESGP-CFP relationship

	Author(s), date	*Sample characteristic*			*Measures*		*Relation ESGP-CFP founded*
		Country	*No. of entities*	*Time-period*	*ESGP*	*CFP*	
1	Aboud and Diab (2018)	47 countries	1996	2012–2016	ESG Disclosure	Tobin's Q	⊕
2	Albuquerque et al. (2019)	Listed in US	4670	2003–2015	MSCI index	ROA, Tobin's Q	⊕
3	Atan et al. (2016)	Malaysia, Denmark	164	2013	ESG Disclosure Index	EVA	×
4	Baron et al. (2011)	USA	1600	1996–2004	Aggregate CSR strengths index and CSR concerns index	Tobin's Q	⤮
5	Bodhanwala and Bodhanwala (2019)	India	41	2010–2015	ESG score	Stock Price	⊕
6	Buallay et al. (2020)*	Mena Banks	59	2008–2017	ESG Total score	ROA, ROE, Tobin's Q	⊕
7	Buallay (2019)*	Europe	235	2007–2016	ESG disclosure Total and partial score (Overall ESG index)	ROA, ROE, Tobin's Q	⊕
8	Buallay and et al. (2019)*	80 countries	932	2008–2017	ESG disclosure Total and partial score (Overall ESG index)	ROA, ROE, Tobin's Q	⊖
9	Cai et al. (2012)	USA	475	1995–2009	Aggregate CSR index	Tobin's Q	⊕
10	Cek and Eyupoglu (2020)	USA	500	2010–2015	ESG partial score	Economic performance	⊕×
11	Cochran and Wood (1984)	USA, Europe	75	1970–1979	CSR reputation index	Operating earnings to asset, Operating earnings to sales, excess market valuation	⊕

	Author(s), date	*Sample characteristic*			*Measures*		*Relation ESGP-CFP founded*
		Country	*No. of entities*	*Time-period*	*ESGP*	*CFP*	
12	Cornett et al. (2014)*	USA	190	2003–2011	ESG ratings	ROA, ROE	⊕
13	Cornett et al. (2016)*	USA	235	2003–2013	ESG Rating	ROE	⊕
14	Do and Kim (2020)	Korea	609	2011–2018	ESG rating	short term abnormal returns (dividend yield, monthly market returns, stock price volatility)	⊕
15	Duque-Grisales and Aguilera-Caracuel (2019)	Brazil, Chile, Colombia, Mexico, Peru	104	2011–2015	ESG Score (total and partial score)		⊖

(continued)

Table 5.1 (continued)

	Author(s), date	*Sample characteristic*			*Measures*		*Relation ESGP-CFP founded*
		Country	*No. of entities*	*Time-period*	*ESGP*	*CFP*	
16	Forgione et al. (2020)*	22 countries	131	2013–2017	ESG partial score	Efficiency scores (Profit before tax, Net loans, Other earning assets, Total deposits, Interest expenses to Total deposits, Depreciation to fixed assets, Staff expenses to n. of employees, Bank equity)	⊖
17	Garcia et al. (2019)	Brazil, Russia, India, China, South Africa	365	2010–2012	ESG performance	ROA, Free cash flow, Market capitalisation, Systematic risk	⨯
18	Garcia-Castro et al. (2010)	USA	658	1991–2005	Aggregate stakeholder relations measure	ROA, ROE, Tobin's Q, MVA	×
19	Jha and Rangarajan (2020)	India	500	2008–2018	ESG Score (total and partial score)	ROA, ROE, Tobin's Q	⨯
20	Jo and Harjoto (2011)	USA	7750	1993–2004	Aggregate CSR index and governance index	CSR-combined scores	⊕
21	Koh et al. (2014)	USA	3000	1991–2007	Aggregate CSR score	Z-score	⊕
22	Landi and Sciarelli (2019)	Italy	40	2007–2015	ESG Rating	Abnormal returns	×
23	Lo and Kwan (2017)	Hong Kong	17	2010–2012	ESG disclosure events	Stock Price	⊕
24	McWilliams and Siegel (2000)	USA	524	1991–1996	Socially responsible indicator variable	Economic performance	×

	Author(s), date	*Sample characteristic*			*Measures*		*Relation ESGP-CFP founded*
		Country	*No. of entities*	*Time-period*	*ESGP*	*CFP*	
25	Miralles-Quirós et al. (2018)*	Brazil	73	2010–2015	ESG scores	Stock Price	⊗
26	Miralles-Quirós et al. (2019a)*	31 countries	166	2010–2015	ESG partial score (ESG Score)	Tobin's Q	⊗
27	Miralles-Quirós et al. (2019a)*	20 different stock market	51	2002–2015	ESG Total and partial score (Overall ESG Pillar)	Stock Price	⊗
28	Nizam et al. (2019)*	75	713	2013–2015	MSCI index	ROE	⊕
29	Pava and Krausz (1996)	USA	106	1985–1991	Aggregate CSR score	Market Returns, P/E Ratio, Market to Book Value, ROA, ROE, ESP, Current Ratio, Altman's Z-Score	⊕
30	Peng and Isa (2020)	20 countries	461 sh. Com	2010–2017	ESG Score (total and partial score)	ROA, Econ	⊕
31	Servaes and Tamayo (2013)	USA	10,712	1991–2005	Aggregate CSR index	Tobin's Q	⊕
32	Shakil et al. (2019)*	Emerging market	93	2015–2018	ESG partial score (Overall ESG index)	ROA, ROE	⊗
33	Velte (2019)	Germany	775	2010–2018	ESG in total and its three pillars	ROA	⊕

(continued)

Table 5.1 (continued)

	Author(s), date	*Sample characteristic*			*Measures*		*Relation ESGP-CFP founded*
		Country	*No. of entities*	*Time-period*	*ESGP*	*CFP*	
34	Waddock and Graves (1997)	Listed in USA	467	1989–1991	Weighted average CSR index	ROA, ROE, ROS	⊕
35	Wu and Shen (2013)*	22 countries	162	2003–2009	Aggregate CSR index	ROA, ROE, Non-Performing Loan/Total Loan, Net interest income/(Net interest income + Non-interest income), Non-interest income/(Net interest income + Non-interest income)	⊕
36	Yoon et al. (2018)	Korea	705	2010–2015	ESG Score (total and partial score)	Stock Price	⊕

Source La Torre et al. (2021)
⊕ positive; ⊖ negative; ⨯ mixed; × no effect
*Studies focused on the banking sector

mixed relationships (Buallay et al., 2020). Differences in outcomes may also be influenced by the methods utilised, the metrics used and the geographical areas.

Our chapter examines a sample of listed European banks using classic performance metrics and measures more linked to Value-Based Metrics (VBM) that were not previously explored to understand better the relationship between ESGP and CFP, including market sentiment. Higher ESGP is expected to result in greater banking performance, as it does in most other industries.

Research Design

To verify the relationship between ESGP and CFP of banks, we used the following baseline model:

$$Y_{it} = \alpha + \beta X_{it} + \gamma z_{it} + \eta_i + \varepsilon_{it} i = 1, 2 \ldots, N t = 1, 2 \ldots, T \qquad (5.1)$$

where (i) Υ_i refers to the level of different measures of Financial Performance of bank i in year t; (ii) X_i is a matrix containing the k indicators of banks; (iii) z_i is the bank control variables; (iv) α, β and γ, the $(1 + k)$ coefficient vectors, were to be estimated; and finally (v) $(\eta_i + \varepsilon_i)$ is the error term that is assumed to be independent of the k regressors and the bank-specific control variable.

Dependent Variable (y_i)

As highlighted above, different bank performance measures were used to deepen the ESGP-CFP relationship in previous studies (Table 5.1) with different results: (a) The majority of current research (after 2015) focus solely on account-based ratios (ROA and ROE, Cornett et al., 2016; ROE Nizam et al., 2019; Shakil et al., 2019); various efficiency ratings (Forgione et al., 2020) or (b) in combination with market-based metrics (ROA, ROE, and Tobin's Q at the same time) (Buallay, 2019; Buallay et al., 2019, 2020); (c) finally, another line of research focused on market-based metrics such as Stock Price (Miralles-Quirós et al., 2018) or Tobin's Q (Miralles-Quirós et al., 2019b).

In line with previous contributions, we employed archetypal CFP (Bocean & Barbu, 2007), both account-based and market-based, and, unlike the others, we consider VBM. We then defined five models (Table

5.2) associated with the different measures of the bank CF used as dependent variables (Υ_i).

In Model 1, Υ_i is represented by EVA Spread (EVA_S), the VBM through which investors may evaluate whether a firm is pointing in the direction of wealth creation (Fabozzi & Grant, 2008). According to Clark et al. (2015) and Serafeim (2020), the benefits of management's attention to ESG concerns may result in both greater and more stable returns affecting ROC, as well as a reduction in the cost of capital (WACC) (2020). As a result, because EVA S is calculated as ROC—WACC, the end effect would be twofold. We then assumed a healthy and positive link between this metric and the bank's ESGP; to the best of our knowledge, this relationship has yet to be investigated in the literature. The dependent variables in Models 2 and 3 are based on market performance. We started with the well-known Tobin's Q ratio (T's_Q) (Buallay et al., 2019, 2020; Buallay, 2019; Miralles-Quirós et al., 2019a) for its capability of synthesising both valuation and performance from the value creation perspective (Jha & Rangarajan, 2020) set to render the point of view of bank stakeholders in the long term. In Model 3, we chose Average Capitalisation to Book Value (A CAP BV) as Yi because of its attitude to indicate the appropriateness of bank shareholders' remuneration (Caprio et al., 2011) and the ability to measure the shareholder position differently from earlier contributions. The two CFPs obtained from capital market banking valuation are, by definition, based not just on historical data but also on future projections (Jiao, 2010). Stock performance is the best gauge to approximate value creation for both shareholders (Myers & Allen, 1991) and stakeholders in a market with semi-strong efficiency. Beyond financial returns, the basic hypothesis of the two models is that a wealth-maximising impact drives investors who choose stocks with high ESGP due to a favourable influence of ESG actions on future earnings and positive market expectations established by institutional and individual investors (Borgers et al., 2013; Derwall et al., 2011; Greenwald, 2010). The remaining two models are account-based and concentrate on the widely used ROA (Model 4) and ROE (Model 5) metrics (Buallay et al., 2019, 2020; Buallay, 2019; Shakil et al., 2019).

On the one hand, ROA proxied a bank's ability to generate profits by utilising internal assets; on the other hand, ROE analysed how corporations manage their capital to generate profits. Both ratios are expected to rise in the presence of increasing ESGP, based on prior contributions in other industries. We employed normalised ratios (N ROA, N ROE)

Table 5.2 Models considered in the analysis

	VBM	*Market-based*		*Account-based*	
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*
Υ_{it}	EVA_S	A_CAP_BV	T's_Q	N_ROA	N_ROE
X_{it}	E_PS	E_PS	E_PS	E_PS	E_PS
	S_PS	S_PS	S_PS	S_PS	S_PS
	G_PS	G_PS	G_PS	G_PS	G_PS
	LTD	LTD	LTD	LTD	LTD
	NET_REV_GRW	NET_REV_GRW	NET_REV_GRW	NET_REV_GRW	NET_REV_GRW
	TRBC	TRBC	TRBC	TRBC	TRBC
	C_I	C_I	C_I	C_I	C_I
	NIRR_IM	NIRR_IM	NIRR_IM	NIRR_IM	NIRR_IM
	GRW_TOT_LOAN	GRW_TOT_LOAN	GRW_TOT_LOAN	GRW_TOT_LOAN	GRW_TOT_LOAN
	ROA_TO_ROE	ROA_TO_ROE	ROA_TO_ROE	–	–
z_i	log_TA	log_TA	log_TA	log_TA	log_TA
	GDP_GRW	GDP_GRW	GDP_GRW	GDP_GRW	GDP_GRW

to exclude the impacts of seasonality, revenue and unusual or one-time expenses.

Independent (X_i) and Control Variables (z_i)

As ESGP, we employed the single ESG Pillar Scores calculated by Eikon Thomson Reuters. The annual ESG Pillar scores for each company range between 0 and 100 points allowing a straightforward evaluation of management practices of banks: e.g. Laggards (from 0 to 25) or Leaders (from > 75 to 100) for each ESG Pillar. In particular:

- the Environmental Pillar Score (E_PS) measures the role of banks in minimising resources, reducing emissions and product innovation;
- the Social Pillar Score (S_PS) synthesise the bank's social performance, measuring its attitude in offering financial products and services that integrate ethical principles, its commitment to the community, and employees creating a healthy and safe work atmosphere, respecting diversity and human rights and providing equal opportunities;
- the Governance Pillar Score (G_PS) indicates the inclusion of sustainable values operated by a bank in its vision, decision-making processes and communication practices.

Being aware that bank CFP is not affected only by the level of ESG Pillar scores, we included other explanatory variables (X_i) in the regression models, namely:

- Loan to Deposit (LTD), as a proxy of banks' liquidity (Van Den End, 2016).
- Net Revenue Growth (NET_REV_GRW), as a measure of the level of "health" of bank's sales;
- Total risk-based capital ratio (TRBC), as a proxy of the capital adequacy;
- Cost to Income (C_I), as a proxy of efficiency;
- Net Interest Rate Revenues to Intermediation Margin (NIRR_IM) as a proxy of the business model of the bank;
- Growth in Total Loan (GRW_TOT_LOAN), to assess bank's lending activity (Köhler, 2012);

- ROA to ROE (ROA_TO_ROE) as a synthetic proxy of profitability.

For all models, we explored the possibility that CFP might depend on the specificity of the bank size (Chih et al., 2010; Cornett et al., 2016; Finger et al., 2018; Hu & Scholtens, 2014; Shen et al., 2016) expressed by the logarithm of Total Asset ($z_i = \log\_TA$). Besides, we controlled the models using the GDP growth rate (GDP_GRW) to verify the possible dependence of the bank performance on the state of the economy in each country (Chih et al., 2010; Shen et al., 2016; Wu & Shen, 2013).

Sample and Data Collection

The sample is composed of 98 commercial banks which are public listed[1] in Europe from the year 2008 to 2020, covering 21 countries in total (Table 5.3), and for which exist the ESG Pillar Scores by Eikon Thomson Reuters, while market and accounting information was drawn from Bloomberg.

Table 5.4 summarises the descriptive statistics of the variables used in the analysis and highlights the presence of missing data in some years. Since it was not possible to replace the banks with typical missing data management techniques, it was necessary to exclude banks and the observations relating to some years. This exclusion led to the variability of observations among the performed models, ranging from 882 to 920.

For all banks included in the sample, we collected data annually, in the period during which we assisted in the reflection of financial turmoil impulse by the subprime crisis and the sovereign debt crisis suffered in some European countries. Broadly speaking, these circumstances affected all CFPs of the sample. Looking at Table 5.4 and Fig. 5.1, we notice that all values, except EVA_S and N_ROE, tend to be close to the mean, and the range of variation is not so high, resulting in a generalised low level of financial performance among the sampled banks.

As mentioned, we controlled the economic moment that banks were going through, considering differences in the economic growth of countries and the size of banks. While GDP_GRW values are spread out over a broader range across time and countries, the size of banks in the sample is relatively homogeneous.

[1] As of May 2021.

Table 5.3 The sample (distribution by Country, Total Asset (mln €), ESG Pillar Score)

Country	*No. of Banks*	*Total Asset*	*E_PS*	*S_PS*	*G_PS*
AUT	3	443,554.4	73.04856	80.18352	52.70935
BEL	1	290.591	91.14949	80.91359	40.46781
CHE	7	1052.002	28.96112	40.96505	54.6277
CYP	2	601,147.7	21.53918	48.37157	47.46174
CZE	2	1296.387	28.37947	44.40134	69.16667
DEU	5	1860.349	49.86904	64.1494	59.18506
DNK	5	4704.580	53.05736	42.17709	38.80013
ESP	8	3226.455	66.74641	76.74381	70.19901
FIN	2	564,545.1	67.13171	62.39936	41.26984
FRA	3	5288.851	94.87857	87.31048	77.09014
GBR	11	6298.253	49.74583	63.27453	68.80324
GRC	4	253,697.6	57.70374	79.0396	78.31723
HUN	1	20,121.767	71.08218	69.75537	35
IRL	3	250.723	42.31143	60.92864	51.46129
ITA	14	2348.155	55.31382	68.36973	49.55533
LIE	2	36,061.75	24.11527	42.45797	50
NLD	2	1266.798	87.45462	69.07878	65.58088
NOR	5	3311.792	40.33626	50.21636	51.01695
POL	11	1535.773	52.04566	70.16878	60.6653
RUS	3	47,899.297	37.54426	56.8538	40.46264
SWE	4	8371.979	66.45396	66.56994	53.82149

With reference to ESG Pillar Scores (Table 5.4), mean descriptive statistics denote significant variations between sampled banks.

Results and Discussion

The study exploited panel data model estimates as expressed in [1] to deepen the relationship between bank ESGP, economic performances and market sentiment towards banks ESG activities. Appendices A and B display the summary of panel data variables.

To verify the validity and the consistency of the instrumental variables chosen, we tested the five models by applying the Hausman test (Hausman, 1978). Results revealed that for Models 1–3, 5, marked by a Prob > chi^2 0.0000 (Table 5.5), the estimator within (Fixed effects, Fe) was the most suitable, which made us reject the null hypothesis for the individual α_i effects, which significantly correlated with at least one

Table 5.4 Descriptive statistics of the sample

Variables	*Obs*	*Mean*	*Std. Dev*	*Min*	*Max*
Dependent					
EVA_S	920	–0.9273173	4.347834	–63.4924	20.036
A_CAP_BV	916	1.096266	0.8012441	0.0269	8.5201
T's_Q	915	1.008558	0.0609786	0.5689	1.4565
N_ROA	916	0.5317132	1.009741	–12.4461	3.8701
N_ROE	916	7.698787	14.12876	–148.9404	142.5936
Independent					
E_PS	920	49.69317	32.83496	0	97.43303
S_PS	920	56.63108	23.02494	0.6306375	97.24301
G_PS	920	56.01424	23.69941	1.857506	97.18805
LTD	898	123.4031	50.31875	5.1571	519.831
NET_REV_GRW	914	5.832171	58.16445	–87.3258	1653.792
TRBC	882	16.51651	3.966185	–5	39.73
C_I	917	63.84396	30.62973	–97.0615	351.6778
NIRR_IM	917	0.5874469	0.1659129	–0.5423775	1.962766
GRW_TOT_LOAN	892	6.076422	19.01198	–29.0845	199.1306
ROA_TO_ROE	917	0.0735408	0.0436986	–0.4755	0.4926
Control					
GDP_GRW	919	0.0200851	0.0685152	–0.3378723	0.34815
log_TA	920	5.339151	0.7794824	3.087841	7.556495

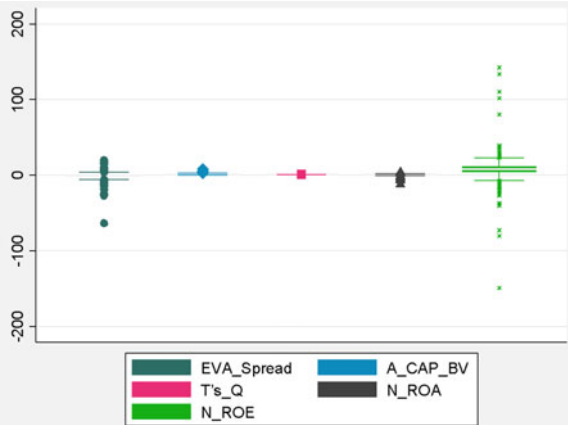

Fig. 5.1 Boxplot of CFPs (* The Y-axis represents the minimum, the first quartile, the median, the third quartile and the maximum of each CFP used in the analysis)

regressor. On the other hand, after finding a Prob > chi^2 0.0055 for Model 4, we explored the possibility of better estimates using Random effects (Re). Results of Breusch and Pagan Lagrange Multiplier, Prob > chi^2 0.000 (Breusch & Pagan, 1980) suggested that the GLS estimator (Re) was the most appropriate to describe Model 4, excluding the OLS option. In the case of Model 4, panel data model estimates could be expressed with the following:

$$Y_{it} = b_1 X_{it} + g z_{it} + n_{it} \tag{5.2}$$

where $n_{it} = a_i + u_{it}$

Even if environmental performances are crucial for some types of investors and different kinds of stakeholders, someone may observe that it is less relevant in the banking industry since banks may not cause serious problems of environmental pollution such as other sectors. It is equally valid that including the environmental aspect in the decision-making would grant significant savings in the billing of electricity, water, fuel and paper use (Miralles-Quirós et al., 2019b). In banks' case, the pressure exerted by customers and regulators on financial institutions could change their attitude in selecting project environmental-oriented. Results (Table 5.5) disprove the assumption since shown a generalised negative correlation in most of the models, except Model 2 (not statistically relation revealed) and Model 3 (positive and small correlation).

Social performance, which measures banks commitments and effectiveness in generating trust and loyalty with customers, employees and society (Miralles-Quirós et al., 2019b), does not seem to satisfy the bank's shareholders equally. This is testified by the negative correlation with T's_Q and the absence of a statistical correlation with A_CAP_BV. On the other hand, we have found a positive statistically significant relation with EVA_S and N_ROE.

According to the literature, a higher score of governance performance means greater accountability and transparency, with a consistent reduction in agency costs for shareholders (Jamali et al., 2008; Miralles-Quirós et al., 2019b). This relationship could be more evident in listed companies. Surprisingly results testify that market-based models reveal the absence of a direct relationship (Model 3) or the presence of a negative one (Model 2). While in the accounted-based models, the governance measure is positively correlated with both CFP.

Table 5.5 Banks' ESG Pillar Scores and financial performance: regression results

		VBM	*Market-based*		*Accounted-based*	
Variables		*Model 1* *EVA_S*	*Model 2* *A_CAP_BV*	*Model 3* *T's_Q*	*Model 4* *N_ROA*	*Model 5* *N_ROE*
E_PS		−0.02204244**	−0.00178956	0.00023642*	−0.00502682**	−0.05907196**
S_PS		0.03430128***	−0.00188909	−0.00064259***	0.00069298	0.07467936**
G_PS		0.00167268	−0.00270656*	−0.00011964	0.00451783**	0.04714439*
LTD		−0.0117074***	0.00013226	−0.00001854	−0.00367961***	−0.03501816***
NET_REV_GRW		−0.01862917**	0.00397944***	0.00043652***	0.0013204	0.02996945*
TRBC		0.08973751**	−0.00647586	−0.00017966	0.05339203***	0.02486863
C_I		−0.06598136***	−0.00341539***	−0.00011847*	−0.01172477***	−0.17706873***
NIRR_IM		1.4960937	0.7575302***	0.02371567	1.0031091***	14.231815***
GRW_TOT_LOAN		0.00714513	0.00378149***	0.00010801	0.00466591**	0.01196173
ROA_TO_ROE		−5.437689	0.84053509	−0.00886841	–	–
GDP_GRW		−1.6779009	1.3638351***	−0.01164056	2.4019461***	19.380228***
log_TA		−0.51960461	−0.66116959***	−0.06428313*	−0.04171924	−5.7533279
Const		5.5262818**	4.7396867***	1.3838088***	0.37926745	40.104707*
Group Variable		Banks	Banks	Banks	Banks	Banks
Time effect		Yes	Yes	Yes	Yes	Yes
No. obs		870	867	867	870	870
No. Groups		93	93	93	93	93
Reg. Model		FE	FE	FE	RE	FE
Prob > chi^2		0.0000	0.0000	0.0000	0.0000	0.0000
	Within	0.2180	0.1952	0.1477	0.2463	0.2786
R-sq	Between	0.4415	0.0562	0.0555	0.3864	0.1681
	Overall	0.2974	0.0643	0.0412	0.3100	0.1602

Estimates table star (*0.05, **0.01, ***0.001)

Generalising, we record a relationship between ESG Pillar Score and CFP, however, with a different sign from what was expected and already detected in other analyses. Furthermore, the contribution to the explanation of CFPs is given by the other independent variables considered and the control variables.

Compared to our previous study, it is possible to obtain more precise indications on the impact of ESGPs starting with the EVA Spread (EVA_S), which had a positive relationship with the total ESGP. At the same time, this in-depth analysis shows a positive relationship with the social component (S_PS) and negative with the environmental one (E_PS). Regarding Model 2, the current study confirms a negative relationship between the ESGPs and solely for the governance component. The misalignment between shareholder expectations and ESGPs is documented in Model 3, especially regarding the social component (S_PS). If, in this case, there is no relationship with the governance component (G_PS), Model 3 is the only one that testifies to a positive, albeit shallow, relationship with the environmental component (E_PS). Finally, as regards the accounted-based models, compared to the previous analysis, in this case, results detected causal effects with the ESG Pillar Scores. In particular, the sign is negative for the environmental component (E_PS) and positive for the governance component (G_PS) for both models; the social component (S_PS), on the other hand, has a direct influence only on the ROE (N_ROE).

Conclusions

ESG issues are relevant in banking since financial institutions are themselves the object of investment, and, at the same time, play a crucial role in the allocation of resources in the economy: selecting investment, managing risks, and deciding who merits access to capital and what activities deserve to be financed (Beck et al., 2010).

In this chapter, we focus on the relationship between ESGP and CFP, assuming ESG Pillar Scores as measures of the spontaneous incorporation of ESG factor in the bank decision-making process. In particular, we aimed to verify the presence of sufficient incentives for the management in the market to be spontaneously ESG-oriented. The verification of a positive relationship between ESGP and CFP would mean the existence of incentives to adopt such conduct, including selecting sustainable projects.

This study went beyond our previous study exploring the relationship between the ESGP and CFP, considering the single Pillar Score (E, S, G)

as a proxy of ESGP, and both account-based and market-based as well as value creation measures as CFP.

Our findings allow us to deepen knowledge about the orientation of banks towards the implementation of ESG practises and to understand whether it is CFP and value creation that drives them to be ESG-oriented or whether banks need to be driven by regulation and/or market pressure. Moreover, the research contributes to an increase in the strand of literature that has studied the relationship between ESGP and CFP of banks.

Even if results have shown a generalised existence of a relationship, the size and direction it assumes do not allow us to say that management finds stimuli in orienting itself towards ESG issues.

Results shown an unexpected negative relationship between environmental performance and accounted-based measures where at least savings in the billing of electricity, water, fuel and paper should have had an effect. Not even EVA_S has benefited from a greater performance of E_PS. Only Tobin's Q register a shaded positive causal link, probably not sufficient to justify the presence of market motivations.

We find no alignment between shareholders' and stakeholders' expectations since in market-based models there is a negative statistically significant relationship between Tobin's Q and social component and no causal effect in the case of A_CAP_BV. The social component seems to be more relevant in the case of EVA_S and N_ROE. It was also surprising that neither governance component affects in a relevant manner market-based models (negative statistically significant in A_CAP_BV and no causal effect with Tobin's Q), while exerting a positive effect on both accounted-based measures.

As already observed in our previous study, also in this case we note the lack of spontaneous alignment of the views of all stakeholders on ESG issues. Therefore, if we want to exploit the banking sector as a catalyst for the sustainable development of the realities in which they operate, corrective measures must be introduced, such as at the regulatory level.

Appendix A. Data Panel Descriptive Statistic

Variable		*Mean*	*Std. Dev*	*Min*	*Max*	*Observations*
E_PS	overall	4.969.317	3.283.496	0	9.743.303	$N = 920$
	between		2.978.189	0	9.054.602	$n = 98$
	within		1.437.594	–8.610.095	1.084.005	T-bar = 9.38776
S_PS	overall	5.663.108	2.302.494	0.6306375	9.724.301	$N = 920$
	between		1.979.921	12.558	9.032.054	$n = 98$
	within		1.161.393	–7.808.608	9.897.261	T-bar = 9.38776
G_PS	overall	5.601.424	2.369.941	1.857.506	9.718.805	$N = 920$
	between		2.085.504	2.660.524	8.813.325	$n = 98$
	within		1.240.258	1.199.819	9.908.402	T-bar = 9.38776
LTD	overall	1.234.031	5.031.875	51.571	5.198.318	$N = 898$
	between		4.436.409	1.041.035	2.876.958	$n = 96$
	within		2.687.189	3.607.411	3.555.391	T-bar = 9.35417
NET_REV_GRW	overall	5.832.171	5.816.445	–873.258	1.653.792	$N = 914$
	between		8.838.402	–1.626.925	872.014	$n = 97$
	within		4.120.052	–7.759.463	7.876.106	T-bar = 9.42268
TRBC	overall	1.651.651	3.966.185	–5	39.73	$N = 882$
	between		301.322	1.146.667	287.975	$n = 93$
	within		2.813.961	0.0006746	2.744.901	T-bar = 9.48387
C_I	overall	6.384.396	3.062.973	–970.615	3.516.778	$N = 917$
	between		2.041.729	1.983.521	1.389.773	$n = 97$
	within		2.343.858	–7.493.388	2.993.643	T-bar = 9.45361
NIRR_IM	overall	0.5874469	0.1659129	–0.5423775	1.962.766	$N = 917$
	between		0.1567717	0.075804	1.003.892	$n = 97$
	within		0.0953016	–0.6080081	1.760.501	T-bar = 9.45361
GRW_TOT_LOAN	overall	6.076.422	1.901.198	–290.845	1.991.306	$N = 892$
	between		1.596.115	–1.279.673	1.057.353	$n = 96$
	within		1.579.907	–5.844.448	1.888.024	T-bar = 9.29167

(continued)

(continued)

Variable		*Mean*	*Std. Dev*	*Min*	*Max*	*Observations*
ROA_TO_ROE	overall	0.0735408	0.0436986	−0.4755	0.4926	$N = 917$
	between		0.0394987	−0.0131417	0.2583	$n = 98$
	within		0.0281309	−0.3888175	0.4544408	T-bar = 9.35714
GDP_GRW	overall	0.0200851	0.0685152	−0.3378723	0.34815	$N = 919$
	between		0.0248443	−0.0334347	0.093743	$n = 98$
	within		0.0647122	−0.361214	0.3392399	T-bar = 9.37755
log_TA	overall	5.339.151	0.7794824	3.087.841	7.556.495	$N = 920$
	between		0.8179462	321.341	7.253.287	$n = 98$
	within		0.0948874	4.914.298	5.694.205	T-bar = 9.38776
EVA_S	overall	−0.9273173	4.347.834	−634.924	200.367	$N = 920$
	between		3.390.739	−1.015.565	1.156.535	$n = 98$
	within		3.482.696	−5.426.407	1.529.317	T-bar = 9.38776
A_CAP_BV	overall	1.096.266	0.8012441	0.0269	85.201	$N = 916$
	between		0.8537427	0.3268615	659.345	$n = 98$
	within		0.4569083	−1.676.501	6.562.899	T-bar = 9.34694
T's_Q	overall	1.008.558	0.0609786	0.5689	14.565	$N = 915$
	between		0.0589698	0.9292	127.314	$n = 98$
	within		0.0382508	0.6087888	1.346.858	T-bar = 9.33673
N_ROA	overall	0.5317132	1.009.741	−124.461	38.701	$N = 916$
	between		0.8138232	−1.338.533	3.523.633	$n = 98$
	within		0.7142329	−1.057.585	2.771.322	T-bar = 9.34694
N_ROE	overall	7.698.787	1.412.876	−1.489.404	1.425.936	$N = 916$
	between		1.065.142	−196.572	8.061.231	$n = 98$
	within		9.584.283	−1.215.844	6.968.008	T-bar = 9.34694
Country	overall	1.192.935	5.648.038	1	21	$N = 920$
	between		5.701.643	1	21	$n = 98$

(continued)

(continued)

Variable		*Mean*	*Std. Dev*	*Min*	*Max*	*Observations*
	within		0	1.192.935	1.192.935	T-bar = 9.38776
Banks	overall	4.856.196	2.812.363	1	98	$N = 920$
	between		2.843.413	1	98	$n = 98$
	within		0	4.856.196	4.856.196	T-bar = 9.38776
Year	overall	2.014.455	3.659.943	2008	2020	$N = 920$
	between		217.994	2013	2019.5	$n = 98$
	within		3.338.521	2.008.455	2.020.872	T-bar = 9.38776

Appendix B. Correlation Matrix

	E_PS	*S_PS*	*G_PS*	*LTD*	*NET_REV_GRW*	*TRBC*	*C_I*	*NIRR_IM*	*GRW_TOT_LOAN*	*ROA_TO_ROE*	*GDP_GRW*	*log_TA*	*EVA_S*	*A_CAP_BV*	*Ts_Q*	*N_ROA*	*N_ROE*
E_PS	1.0000																
S_PS	0.7964	1.0000															
G_PS	0.4944	0.5431	1.0000														
LTD	0.0380	−0.0240	−0.0047	1.0000													
NET_REV_GRW	−0.0688	−0.0650	−0.0777	−0.0379	1.0000												
TRBC	0.1474	0.1585	0.1173	−0.0893	0.0062	1.0000											
C_I	0.0203	0.0079	−0.0497	−0.0982	−0.0037	−0.0709	1.0000										
NIRR_IM	−0.1403	−0.1314	−0.1051	0.2177	−0.0260	−0.1446	−0.0183	1.0000									
GRW_TOT_LOAN	−0.1673	−0.1110	−0.0449	−0.0832	0.3729	−0.0058	−0.0657	−0.0429	1.0000								
ROA_TO_ROE	−0.3090	−0.1949	−0.0729	−0.1126	0.1381	0.0511	−0.1211	0.1377	0.0875	1.0000							
GDP_GRW	−0.0831	−0.0503	−0.0029	−0.1073	−0.0073	0.0814	0.0845	−0.0173	0.0435	0.0482	1.0000						
log_TA	0.5327	0.4738	0.3101	0.0837	−0.0888	0.1110	−0.1144	−0.0344	−0.1215	−0.2192	−0.0132	1.0000					
EVA_S	−0.0197	0.0478	0.0701	−0.0639	−0.0417	0.0987	−0.5586	0.0036	0.0839	0.0642	−0.0771	0.0211	1.0000				
A_CAP_BV	−0.2296	−0.1659	−0.0145	−0.2239	0.0588	0.2003	−0.1773	−0.1157	0.3283	0.2036	0.1882	−0.1859	0.1896	1.0000			
Ts_Q	−0.2488	−0.2073	−0.0106	−0.2017	0.0888	0.1418	−0.1548	−0.0668	0.2371	0.2689	0.0974	−0.1845	0.1061	0.6832	1.0000		
N_ROA	−0.1961	−0.0870	0.0344	−0.1849	0.0189	0.2269	−0.3741	−0.0150	0.2000	0.3580	0.2068	−0.0097	0.3296	0.4096	0.3704	1.0000	
N_ROE	−0.1526	−0.1344	−0.0419	−0.1560	0.0203	0.1919	−0.4475	0.0232	0.1981	0.0213	0.0749	0.0260	0.3101	0.2823	0.2218	0.5640	1.0000

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CHAPTER 6

Is Performance the Key Issue in SRI Funds? Conclusion and Lessons Learned from Three Decades of Studies

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Introduction

We are facing a new scenario where different threats are arising connected with globalization and environmental considerations like climate change. In this context, investors are increasingly including environmental, social, and governance (thereafter ESG) considerations as they are worried about how these risks may impact the companies included in their portfolios. The traditional market view has been skeptical of the financial impact of including ESG considerations that reduce the investment pool for fund managers (the portfolio theory: Markowitz, 1959; Sharpe, 1964).

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However, the stakeholder theory points in the other direction, and recent academic papers are showing ESG as a competitive advantage. This debate has attracted academic attention, making studies that focus on the performance of SRI among the most influential and most researched topic in the field (van Dijk-de Groot & Nijhof, 2015).

Theories that Support Underperformance of SRI Funds

According to the classical financial theories, we should expect conventional funds (non-SRI) to outperform Socially Responsible Investment (thereafter SRI) funds as they have access to a non-restricted pool of investments. The proponents of the traditional Portfolio Theory (Markowitz, 1959; Sharpe, 1964) imply that restrictions in the investment universe may prevent optimal portfolio creation resulting in equal or lower performance of the restricted pool vs conventional funds (thereafter CF). This screening process could result in eliminating from the investment universe not only certain companies, but entire industries or sectors, such as Tabaco, Gambling, or Defense. Therefore, a restricted universe could result in a potential financial sacrifice (Gasser et al., 2014; Trinks & Scholtens, 2017) and additional costs associated with the screening and monitoring process (Cummings, 2000; Gregory et al., 1997).

The "shunned-stock hypothesis" points out that social investors may create a shortage of demand for irresponsible assets, which in turn can affect stock behavior and create opportunities for the "sin" stocks (Derwall et al., 2011; Han et al., 2021; Hong & Kacperczyk, 2009). From another point of view, green investments are efficiently hedging climate risk (Jin et al., 2020) so firms with higher carbon emissions exhibit a higher return as compensation for their higher carbon risk (Bolton & Kacperczyk, 2021).

Theories that Support Outperformance of SRI Funds

The stakeholder theory suggests that a firm has other groups that have a "stake" in the company apart from shareholders. These stakeholders have a moral claim on the company and firms should create value for all stakeholders (Freeman, 1984; Freeman & Dmytriyev, 2020). A corporation that considers stakeholders' needs in its managerial decisions may result in higher value creation over time (Donaldson & Preston, 1995; Freeman & Cavusgil, 1984).

This value creation could be linked to sustainable firms having a better social image, brand loyalty (Albuquerque et al., 2019, 2020; Flammer, 2015; Heal, 2005; Omura et al., 2021), lower downside and bankruptcy risk (Cooper & Uzun, 2019; Verwijmeren & Derwall, 2010) and could be linked to higher productivity (Flammer, 2015). Furthermore, sustainable businesses exhibit often good quality management (Siddiq & Javed, 2014; Omura et al., 2021). As a result, social responsibility can become a source of competitive advantage (Porter, 1991; Porter & van der Linde, 1995). This results in a positive link between Corporate Social Responsibility (thereafter CSR) and corporate financial performance (Bofinger et al., 2022; Filbeck et al., 2009; Huang et al., 2020; Margolis et al., 2011).

Additionally, SRI investors could potentially benefit from a smaller information asymmetry between investors and companies (Cho et al., 2013; Cui et al., 2018; Hamilton et al., 1993). From a portfolio selection point of view, the "errors-in-expectations hypothesis" points out that CSR information is relevant, and the market fails to incorporate it accurately and timely into the stock price. Sustainable firms tend to be underpriced and thus could deliver abnormally high returns for SRI (Derwall et al., 2011). In this sense, the process of screening and selecting companies with high ESG scores could result in the outperformance of SRI funds vs CF as the restricted pool from which the managers select could be a better pool (Barnett & Salomon, 2006). Furthermore, SRI funds present a more concentrated portfolio that could result in a stronger knowledge of their holdings which could lead to better fund performance.

As we have seen, the relative performance of SRI investments has not been exempted from controversy and debate about these two contradictory perspectives. The increasing volume of academic literature with different approaches and uses of benchmarks in their calculations has made it hard to establish conclusions and has revealed a lack of agreement. This paper aims to perform a literature review on the specific topic of the relative performance of SRI funds vs their conventional counterparts and, from there, to move the debate to other critical issues apart from purely return measures. We believe a focused systematic literature review could help us to answer the following research questions: Can we extract any conclusions about the performance of active SRI equity funds vs conventional funds from almost 3 decades of research? Are there any best practices and do they show a relationship with relative performance

results? Are there any subfields of research that bring new light to the topic or create debates that must be addressed?

The systematic literature review presented here draws on more than 30 years of academic research on SRI equity fund performance. It examined more than 420 academic studies to arrive at a final selection of 54 comparable academic papers. The literature review also provides an overview of the best practices and identifies the trends of the empirical studies reviewed.

This review of SRI fund performance offers two main contributions. First, it offers a selection of truly comparable empirical studies categorized into two groups that are broken into three subsamples that allow us to extract conclusions. Second, our findings show that on average (67% of the studies) there is no difference or that the difference is not significant, and therefore, we propose to move the debate from the financial paradigm of SRI funds to other critical issues.

The paper proceeds as follows: after this introductory section, Section "Previous Literature" reviews previous literature; methodology and data collection are detailed in Sect. "Data", Sect. "Results" presents our results, Sect. "Discussion" is the discussion and finally, our main conclusions are exposed in Sect. "Conclusion".

Previous Literature

There have been previous attempts to synthetize this growing field of research. We categorize them into three groups. The first group includes *broad literature reviews* that research the link between performance and SRI investments both through direct investment (firms/stock) and through pooled investments such as funds/portfolios. The first paper to perform a critical review of the literature on SRI is "Socially responsible investments: Institutional aspects, performance, and investor behavior" (Renneboog et al., 2008a). This work summarizes the findings of 16 papers that study the performance of SRI funds vs Index or Conventional Funds that hint, but not univocally demonstrate, that SRI investments perform worse than conventional funds. Wallis and Klein (2015) performed a more extensive study (53 studies on funds, indices, and portfolios vs their conventional benchmarks for the period of 1986–2012) and Junkus and Berry (2015) combines in their analysis firms and portfolios of different asset classes. AitElMekki (2020) aggregate in their meta-analysis a performance analysis of SRI including different

asset classes (SRI funds, SRI stocks, and SRI portfolios) vs conventional funds and indices. Friede et al. (2015) combine 2200 empirical studies and observe significant differences in the results between the sample of portfolio studies and the non-portfolio.

We categorize the second group as *focused literature reviews* on the topic of performance of SRI funds. Chegut et al. (2011) studies five main themes around proposed best practices such as data quality, social responsibility verification, survivorship bias, benchmarking, and sensitivity and robustness checks. Rathner (2013) performs a meta-regression using a logit model of analyzing the impact of selection criteria on performance and concludes that the survivorship consideration increases the probability of better relative performance of SRI funds. Revelli and Viviani (2015) analyze the relationship between SRI and performance to determine if the inclusion of ESG criteria is more profitable on a sample of 85 papers and 190 observations. The conclusions suggest that the inclusion of this criterion neither implies a weakness nor strength vs traditional investments and that differences in return are derived from the choices made by researchers in their empiric research. C. S. Kim (2019) performs a meta-analysis of 51 papers up to 2016. The paper argues that cultural differences may be affecting the SRI picture and therefore center its research only on the USA market.

In the third group, we find academic papers that use *alternative approaches*: influential literature analysis of the most cited research papers on the topic (Hoepner & McMillan, 2009) and content analysis on literature trends around SRI investing (Capelle-Blancard & Monjon, 2012).

Data

Data Collection

We perform a systematic and reproducible search process (Okoli & Schabram, 2011), screening for SRI equity funds papers (not vs created portfolios or other financial asset classes). We focus on academic papers (peer-review) written in the English language from 1992 (the first known published paper on the topic by Luther et al.) to July 2021 when we performed the search. The keywords include the most used terms in relation to SRI funds. The wildcard (*) and the OR term were used to increase the research. The papers for the review were retrieved using

Thomson Reuter Web of Sciences (WoS) and Scopus. In Table 6.1, we see keywords strings used that yield a total of 420 papers after eliminating duplicates. Furthermore, we have looked at previous Literature Reviews and Meta-Analysis in the field to check cross-references.

For each article the abstract was downloaded, and we performed a manual data cleaning. We completed a screening for inclusion to reach a maximum level of comparability. As pointed out by Kim, the lack of sound papers is affected by the "diversity and complexity of existing studies with regard to samples, methodologies, performance measures, investment universe, benchmarks, etc." (2019, p. 3). Our first criterion is to differentiate into two samples depending on the benchmark used for comparison. In the first sample, we select papers that study Social Responsible Funds vs CF. Papers in this sample compare financial instruments that have similar constraints (regulatory, costs, investment universe, type of management…). The performance of investment funds is affected by specific costs such as fees, transaction costs, or management compensation plans. The second sample selects studies that research SRI funds vs an index. In this sample, studies compare the performance of an active investment (SR investment fund) vs a passive investment (index) which requires no decision-making and does not have the same scrutiny in the equity selection process as a fund (Bauer et al., 2006). To our knowledge,

Table 6.1 Keyword strings used in the search process

Search	*Keywords*		
1	Performance+	Social* responsible+	Mutual fund*
2	Performance+	Social* responsible+	Investment fund*
3	Performance+	SRI+	Mutual fund*
4	Performance+	SRI+	Investment fund*
5	Performance+	Ethic*+	Mutual fund*
6	Performance+	Ethic*+	Investment fund*
7	Performance+	Ethic*+	Invest* trust*
8	Performance+	ESG+	Mutual fund*
9	Performance+	ESG+	Investment fund*
10	Performance+	Environmental, social & governance+	Investment fund*
11	Performance+	Sustainable*	Mutual fund*
12	Performance+	Sustainable	Investment fund*

* is used as a wildcard symbol to broaden the search
+ in addition to the other terms

we are the first paper to analyze this difference in our sample and observe potential differences depending on the benchmark used.

Our second criterion is to exclude from our review all empirical papers that use constructed portfolios for analysis and not actual investment funds. A constructed portfolio (ex-post) does not replicate real-life situations of choices and constraints that SRI or conventional fund managers may encounter.

Our third criterion is to focus on studies that compare equity investment funds. Different asset classes may be affected by asset allocation issues, investment trends, different regulatory requirements (equity vs pensions funds), or different interest rate sensitivity (equity vs bonds). In this sense, we excluded academic studies (excluded papers list for this criterion is available upon request to researchers) that invest in other types of assets: Pension Funds (Ferruz et al., 2010; Martí-Ballester, 2015), Fixed income funds (Derwall & Koedijk, 2009; deVilliers, 1998; Girard et al., 2007; Henke, 2016; Kiymaz, 2019; Scholtens, 2005), Private Equity and ETF's (Folger-Laronde et al., 2020). Furthermore, we exclude studies that focus on a specific subset of SRI responsible funds such as Green and Climate Funds (Dopierała et al., 2020; Ibikunle & Steffen, 2017; Silva & Cortez, 2016). As can be in Fig. 6.1, we use the PRISMA Flow to summarize the process (Moher et al., 2009).

Sample Description

As can be seen in Table 6.2, we arrive at a sample of 54 papers that we divide into 42 studies that use conventional funds as a benchmark and 12 studies that use an index as a benchmark. Due to the specific characteristics of Event studies (analyzing performance before and after an event), we separate them into a subgroup. Therefore, the sample that uses conventional funds as a benchmark is broken down into two subsamples: 35 performance studies and 7 event studies. The full detail of the papers included in each sample can be seen in the Appendix (Tables 6.6, 6.7 and 6.8).

Around 50% of the studies have been published in the last decade. In terms of geography: the *USA is the country that has been studied more times* on an individual basis (up to 17 times), with the UK in second position (7 times). This could be related to the size of the market and the availability of databases and information. As can be seen in Table 6.2, most of the studies in the analysis (72%) have over 30 funds. Studies that

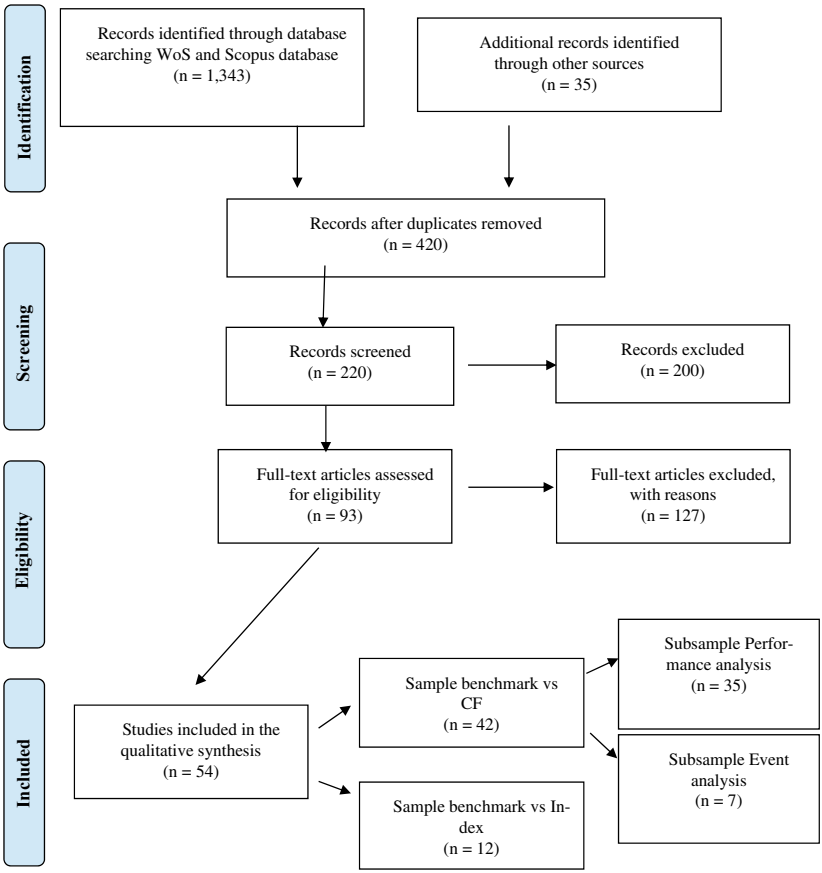

Fig. 6.1 PRISMA flow of literature review search process

include more than 100 funds are Regional (Europe) or Multiregional. The only individual country that has a sample size above 100 is the US. The *average sample size is 122 funds*. The average may be affected by the large sample size of Becchetti et al. (2015) study; if we eliminate this academic paper from the average the sample size falls to 100 SRI funds. The average sample of the subset of studies vs the index is 146, much higher as there are no restrictions associated with the matching process.

Table 6.2 Sample description

	Vs Funds	*Vs Index*	*Event*	*Total*
Studies published before 2000	11%	17%		11%
Studies published between 2000 and 2009	43%	50%		39%
Studies published from 2010–2021	46%	33%	100%	50%
Studies 30 or more SRI funds	71%	58%	100%	72%
Average sample of SRI funds	82	146	272	122
Min sample of SRI funds	13	7	35	7
Max sample of SRI funds	340	748	1213	1213
Average number of years in study	10.3	9.5	8.9	10
Min number of years in study	1	5	1	1
Max number of years in study	21	13	19	21
Total observations	35	12	7	54

The *average period of sample is close to 10 years* in all the subsets; with more than 85% of the papers with a sample of five or more years.

Results

As summarized in Table 6.3, our findings show that *67% of total selected studies find no difference or the difference is not statistically significant* between both types of investments (the percentage increases to 77% if we exclude event analysis). We don't observe significant differences between the sample of funds (77.1%) and the sample of index studies (75%). Our findings are in line with the findings of C. S. Kim (2019) and von Wallis and Klein (2015). This result is in line with the "no net effect" theory that states that the effects of using in SRI investing a hybrid of exclusion and positive screening could end up canceling each other out (Derwall et al., 2011).

Evolution and Trends

In Table 6.4, we study the trends and evolution of best practices in the measurement of relative performance linked to higher sample size, the inclusion of survivorship adjustments, longer periods of analysis, matching variables and their sensitivity, and the more recent use of propensity matching score in the matching process as seen in Alda (2020), Ammann et al. (2019), Bilbao-Terol et al. (2017), Ghoul and Karoui (2020), and

Table 6.3 Main findings

Performance results per studies	*Vs Funds*	*Vs Index*	*Event studies*	*Total*
Number of studies No difference	27	9	0	36
No difference as a %	*77*	*75*	*0*	*67*
Outliers:				
Number of studies where SRI funds outperform	2	1	2	5
Number of studies where SRI funds underperform	3	2	–	5
Number of studies with Mixed results	3	–	5	8

Hoe et al. (2017). The use of multifactor performance measurements (mainly Carhart four-factor) has advantages in the portfolio performance valuation. Full details of the sample and analysis per paper are available upon request.

In the sample that uses an index as a benchmark, 50% of the sample use a conventional index, 42% use both (conventional and SRI) and only one paper uses only an SRI index. In this case, the debate has dwelled on which of the options of indices is more appropriate as a benchmark. Studies show that conventional indexes appear to be more useful and have

Table 6.4 Trends in research

	Period 1 Before 2000 (%)	*Period 2 2000–2009 (%)*	*Period 3 2010–2019 (%)*	*Total (Number of Studies) (%)*	*Total (%)*
Sample above 30 funds	33	62	89	39	72
Period of years 10 or above	33	57	59	30	56
Multifactor measures	33	62	78	36	67
Matching (1–1 and 1 vs many)	50	33	63	27	50
Result: No difference	100	76	59	38	70
Total observations				54	100

a higher explanatory value (Bauer et al., 2005; Bello, 2005; Cortez et al., 2009; Leite & Cortez, 2014a).

Best Practices that Have Been Evolving Through the Literature

Furthermore, we analyze different subfields of research that have been emerging: (1) Pioneers (studies in decade 1, early) (2) Matched pair (focus on the matching process, for example, Mallin and Saadouni [1995] as the pioneer, Renneboog et al. [2008b] as an example of a detailed multiregional matched pair and Gil-Bazo et al. [2010] with a matched pair analysis based on 6 criteria), (3) Attributes (difference in attributes of SRI funds from CF for example in terms of Timing and Stock picking skills like Benson et al. [2006] and Kreander et al. [2005] or Style analysis like Bauer et al. [2005, 2007]), (4) Measures (new approaches to the measurement of performance calculation; mainly DEA conditional approaches like Basso and Funari [2014a], Ito et al. [2013], and Pérez-Gladish et al. [2013]) and (5) Event analysis where 71% of findings were mixed results. The events studied are the financial crisis (86% of the studies), the tech bubble (57% of the studies), and the euro sovereign crisis (29% of the studies). Arefeen and Shimada (2020), is the exception with a focus on the impact of US elections and Brexit on Japanese SRI funds. There is a perception that SRI funds could work as insurance protection from ethical risk (Becchetti et al., 2015) and could decrease downside risk (Nofsinger & Varma, 2014). Nevertheless, other studies showed that performance was different depending on the crisis studied (Arefeen & Shimada, 2020; Becchetti et al., 2015) (Table 6.5).

Table 6.5 Subfields of research

Periods	*Before 2000*		*2000–2009*		*2010–2019*		*Total*	
	#	%	#	%	#	%	#	%
Pioneers	6	100	2	10		0	8	15
Matched Pair		0	3	14	3	11	6	11
Attributes		0	8	38	7	26	15	28
Measures		0	8	38	10	37	18	33
Event		0		0	7	26	7	13
Total Observations	6		21		27		54	100

Discussion

After our analysis, we can conclude that on average (67% of the sample), studies show no difference or statistically no significant difference between SRI and their benchmark. We want to point out relevant issues that have appeared in the Literature Review apart from the purely financial paradigm of SRI funds.

Are SRI Funds Really SRI? the Need for Clearer Definitions and Regulation

One of the key issues after all the debate is the underlying doubt about SRI funds. In the early years after the appearance of SRI funds, they were not perceived as a serious alternative as their financial returns were very poor (Barnett & Salomon, 2006). Furthermore, just being categorized as an SRI mutual fund does not always guarantee the exclusion of unethical firms (Capelle-Blancard & Monjon, 2014; Kempf & Osthoff, 2008; Utz & Wimmer, 2014). Are SRI investments true to their identity? Are SRI funds conventional funds in disguise? Academics have shifted the debate from performance issues to the holding composition of SRI funds. SRI funds have been observed to present different industry betas that are consistent with different portfolios (Benson et al., 2006) and present higher ESG scores (Alda, 2020; Joliet & Titova, 2018; Kempf & Osthoff, 2008; Nitsche & Schröder, 2018). However, other studies have observed lower corporate social performance (Gangi & Varrone, 2018) raising doubts about agency and fiduciary duties, and adoption of the Principles of Responsible Investing has not been linked to an actual improvement in ESG scores and engagement (Kim & Yoon, 2020).

SRI continues to be a concept hard to describe or relate to with just one doctrine, as it has become a multidimensional concept of heterogeneous groups with different needs (Sandberg et al., 2009). We are facing the challenge to create a theory that captures multiple definitions of ESG from the wide and diverse investor community (Daugaard, 2019). The issue will be partially addressed through the introduction of common standardized definitions that will give practitioners and academics the assurance that we are comparing similar financial instruments. The EU taxonomy is a start that could act as a catalyzer for a more consistent categorization as fund managers will have information such as the percentage of the business activities covered by the taxonomy and what percentage is

taxonomy aligned. The taxonomy list is not exhaustive and is expected to increase in the future as other critical factors such as Social is not included at present.

Are All SRI Funds Equal? What About Greenwashing? the Need for Benchmarks of Disclosures

SRI investors are not a homogenous group and differences between funds could reflect differences in values, norms, and ideologies of investors (Sandberg et al., 2009). Can we declare equal all SRI approaches? Are SRI funds vs CF a dichotomous variable? To address these issues a higher disclosure is key. As mentioned previously, SRI funds have been accused of greenwashing and results have been mixed with papers raising concerns about potential greenwashing (Gangi & Varrone, 2018; Gibson et al., 2020; Kim & Yoon, 2020; Leite & Cortez, 2014b; Liang et al., 2021; Utz & Wimmer, 2014) and other papers supporting the true nature of SRI funds (Alda, 2020; Benson et al., 2006; Joliet & Titova, 2018; Kempf & Osthoff, 2008; Nitsche & Schröder, 2018). Depending on the market and region, disclosure has been divided into voluntary and mandatory. The move to global guidelines for CSR/ESG data reporting and global standards, such as the Global Reporting Initiative (GRI) and more recently IFRS Sustainability Disclosure Standards, will increase reporting and harmonization (Einwiller et al., 2016; Fortanier et al., 2011). Scholars argue that refinement in the regulatory system will decrease greenwashing (Seele & Gatti, 2017). The growth in regulation has been a key factor behind the growth of assets in SRI (Siri & Zhu, 2019).

The EU has been a driver in terms of regulation and most recently with the SFDR regulation in force since March 2021. The SFDR will require financial market participants and advisers to follow mandatory disclosures on the integration of sustainability risks and the consideration of adverse sustainability impacts. Furthermore, fund managers must disclose if they categorize themselves as (1) financial product that promotes Environmental and social characteristics (article 8 or "light green"), or (2) financial product that has an objective of positive impact on the environment and society (article 9 or "dark green.") Becker et al. (2021) address the impact on funds ESG scores of SFDR regulation and observed an increase in ESG scores and fund net inflows for the EU fund group after the policy announcement vs the USA.

Independent verification of SRI funds (not required currently under SFDR) is one of the main concerns, as pointed out by Chegut et al. (2011). However, markets are becoming increasingly more aware of the complicated procedure behind the process of measurement of factors like corporate environmental performance (Escrig-Olmedo et al., 2017). Some new questions are arising about if all rating agencies have the same idea and process of measurement of ESG factors and how they transmit sustainability to the assessed companies (Escrig-Olmedo et al., 2019) which have risen doubts on their reliability and the divergence between them (Berg et al., 2019; Christensen et al., 2021; Dimson et al., 2020; Gibson et al., 2019; Yang, 2020).

The Screening Process May Be the Key

Several academics have approached the paradox by analyzing the impact of screening criteria. Simple negative screens associated with exclusion strategies have been associated with lower diversification, increased risk (Humphrey & Lee, 2011), and underperformance (Capelle-Blancard & Monjon, 2014; Leite & Cortez, 2015). On the other hand, positive screening such as "best in class" has been associated with reducing fund risk and outperformance (Goldreyer & Diltz, 1999; Kempf & Osthoff, 2007; Nofsinger & Varma, 2014). Screening practices may also vary depending on geographical regions (Renneboog et al., 2008b, 2011). Not only the type of screening, but the intensity, could impact performance as a too high intensity of screening has been related to poor fund diversification (Barnett & Salomon, 2006; Capelle-Blancard & Monjon, 2014). Furthermore, the number of screens (Fernández Sánchez & Luna Sotorrío, 2014) and sector-specific screens such as environmental screens may reduce financial performance (Barnett & Salomon, 2006; Renneboog et al., 2011) as compared to more transversal screening criteria which may not result in a lesser diversification (Capelle-Blancard & Monjon, 2014).

Do SRI Funds Exhibit Different Characteristics?

The first decade of studies showed specific interest in the issue of small-cap exposure of SRI funds as was initially pointed out by Luther et al. (1992) and later observed by other studies (Bauer et al., 2006; Gregory & Whittaker, 2007; Gregory et al., 1997; Nofsinger & Varma, 2014). As pointed

out by Leite and Cortez (2014b), the study observes differences in small-cap biases linked to the market of the fund with European funds more exposed to small caps. However, in a more recent study, they observed a lower exposure to small caps than conventional funds that could be justified by the "best in class" approach (Leite & Cortez, 2015).

There have been some mixed findings on whether SRI funds exhibit a growth or value bias. Some studies (Bauer et al., 2005; Gregory & Whittaker, 2007; Kempf & Osthoff, 2008) find a more growth bias that according to Benson et al. (2006) could be linked to the difference in industry exposure of SRI funds vs conventional funds. SRI funds may result in a different style of investment like "growth" or "value" investments, style references widely used in the investment world. As seen by Leite and Cortez (2014a), SRI funds may present lower exposures to book-to-market factors.

Looking Forward: Is Performance the Key Issue for SRI Investment?

Let's point out what may seem obvious; if SRI funds' rationale is to go beyond purely financial measures, why is then financial performance such a key issue? (Capelle-Blancard & Monjon, 2012). As we have found through our analysis and previous references suggested, we see that, on average, the performance between both types of funds shows no difference in the studies analyzed (67%).

Among those reasons, investor behavior arises as a key one; investors in SRI funds may be motivated by other reasons apart from performance and may derive a utility from holding consistent with a set of personal values or societal concerns (Bollen, 2007; Pástor et al., 2021). There have been described behavioral differences between the SRI investor and the conventional investor in terms of aversion to unethical behavior apart from the common risk aversion which could suggest that SRI investors may require a lower return to invest in companies that present a lower ethical risk (Renneboog et al., 2008a).

The financial performance of funds is affected by a variety of drivers like diversification, stock cycle, quality of fund management, and not only if ESG factors are considered in the investment process. As Peylo and Schaltegger (2014) comment, it is "quite possible that relationships between sustainability and financial performance elude measurability because they may be overshadowed and dominated by other, more powerful or temporarily more influential factors."

Conclusion

After addressing the debate and controversy surrounding SRI funds and performance; the findings of our literature review show that 67% of the studies that analyze SRI funds' performance vs conventional funds or indices show no difference or the difference is not statistically significant. However, in the end, we have seen that achieving an absolute truth is complicated. Performance of SRI funds may be more linked to other attributes that could relate to the talent of managers, type of screen and intensity, investment management company specialization, regulation impact, geographic location, or management style. As SRI has become mainstream, comments around the potential "greenwashing" of the sector, and doubts about if SRI funds are true to their identity, have increased. One of the key areas for future research could be a deeper analysis and categorization of SRI funds depending on their ESG ratings, screening approach, and SFDR categorization. References of which ESG Portfolio Score ratings are more relevant for investment fund managers in their screening process which will allow them to measure and categorize the portfolio of SRI funds more efficiently. However, ESG data quality and complexity remain a challenge. Furthermore, extending the literature review to study other asset classes such as corporate fixed income (green, social, and sustainable bonds), sovereign bonds, pension funds, or other thematic investments such as green funds.

We have reasons to be optimistic that some of the issues mentioned in our discussion are starting to be addressed by practitioners and regulators as is the case of the EU addressing issues such as the taxonomy and disclosure regulations in funds (SFDR), and incorporation of sustainability considerations in financial advice. In this acceleration of the ESG momentum, it would be a great opportunity to extend benchmarks and taxonomies within an international platform to englobe investors of all regions and with specific consideration for emerging markets that could move to adopt higher CSR standards (Li et al., 2010) and promote a sustainable investing approach.

Appendix

Table 6.6 Subsample of SRI equity funds vs index

	Performance	*Country of funds*	*Period of study*	*#SRI funds*	*conventional index*	*SRI index*	*Multifactor*
Luther et al. (1992)	No difference or weak	UK	1984–1990	15	1	0	0
Luther and Matatko (1994)	No difference or weak	UK	1985–1992	9	1	0	1
Cummings (2000)	No difference or weak	AUS	1986–1994	7	1	0	0
Schröder (2004)	No difference or weak	Multi region	1990–2002	46	1	1	1
Shank et al. (2005)	No difference or weak	US	1993–2003	31	1	0	0
Scholtens (2007)	No difference or weak	Netherlands	2001–2005	7	1	1	1
Jones et al. (2008)	Underperformance	AUS	1986–2005	89	1	0	1
Cortez et al. (2009)	No difference or weak	7 European countries	1996–2007	88	1	1	1
Lean et al. (2015)	Outperformance	Europe and USA	2001–2011	748	1	1	1
Syed (2017)	No difference or weak	UK and France	2004–2009	44	1	0	0
Reddy et al. (2017)	No difference or weak	UK	2004–2014	37	0	1	1
Azmi et al. (2020)	Underperformance	Global	2002–2013	658	1	1	1

Table 6.7 Subsample of SRI equity funds vs conventional funds

#	*Author*	*Performance*	*Country of funds*	*Period of study*	*#SRI funds*	*Free survivorship*	*Matching 1–1*	*Matching 1 vs many*	*# of matching criteria*	*Multi factor*
1	Hamilton et al. (1993)	No difference	USA	1981–1990	32	0	0	1	1	0
2	Mallin and Saadouni (1995)	No difference or weak	UK	1986–1993	29	0	1	0	2	0
3	Gregory et al. (1997)	No difference or weak	UK	1986–1994	18	0	1	1	4	1
4	Goldreyer and Diltz (1999)	No difference	USA	1981–1997	49	0	0	0	0	0
5	Statman (2000)	No difference	USA	1990–1998	31	1	0	1	1	0
6	Bauer et al., (2005)	No difference	Multi region	1990–2001	103	1	0	1	2	1
7	Bello (2005)	No difference	USA	1994–2001	42	1	0	1	1	0
8	Geczy et al. (2005)	Underperformance	USA	1999–2001	49	1	0	0	0	1
9	Kreander et al. (2005)	No difference	Europe	1995–2001	30	0	1	0	4	1
10	Bauer et al. (2006)	No difference	Australia	1992–2003	25	1	0	0	0	1
11	Lozano et al. (2006)	No difference	Spain	2002	14	0	0	0	0	0
12	Benson et al. (2006)	No difference	USA	1994–2003	185	0	0	0	0	0
13	Bauer et al. (2007)	No difference	Canada	1994–2003	8	0	0	0	0	1
14	Bollen (2007)	Mixed	USA	1990–2002	188	1	0	0	0	0

#	*Author*	*Performance*	*Country of funds*	*Period of study*	*#SRI funds*	*Free survivorship*	*Matching 1–1*	*Matching 1 vs many*	*# of matching criteria*	*Multi factor*
15	Gregory and Whittaker (2007)	No difference	UK	1989–2002	32	1	0	1	2	1
16	Koellner et al. (2008)	Mixed	Europe	2000–2004	13	0	1	0	1	0
17	Fernandez-izquierdo and Matallin-saez (2008)	No difference or outperformance	Spain	1998–2001	13	0	0	0	0	1
18	Kempf and Osthoff (2008)	No difference	USA	1991–2004	72	1	0	0	0	1
19	Renneboog et al. (2008b)	Mixed	Multi region	1991–2003	340	1	0	1	4	1
20	Gil-Bazo et al. (2010)	Outperformance	USA	1997–2005	86	1	0	1	6	1
21	Rodríguez (2010)	no difference	USA	1997–2005	31	1	1	0	2	1
22	Humphrey and Lee (2011)	No difference	Australia	1996–2008	27	1	1	0	3	1
23	Ito et al. (2013)	Outperformance	Multi region	2000–2009	109	0	0	0	0	0
24	Pérez-Gladish et al. (2013)	No difference	USA	2007	46	0	0	0	0	1

(continued)

Table 6.7 (continued)

#	*Author*	*Performance*	*Country of funds*	*Period of study*	*#SRI funds*	*Free survivorship*	*Matching 1–1*	*Matching 1 vs many*	*# of matching criteria*	*Multi factor*
25	Fernández Sánchez and Luna Sotorrío (2014)	Underperformance	Europe	1993–2012	184	1	0	1	1	1
26	Basso and Funari (2014b)	No difference	Europe	2006–2009	190	0	1	0	2	0
27	Basso and Funari (2014a)	No difference	Europe	2006–2009	189	0	1	0	2	0
28	Leite and Cortez (2015)	No difference	Europe	2000–2008	54	0	0	1	4	1
29	Muñoz et al. (2015)	No difference	USA	1994–2010	153	1	0	0	0	1
30	Ayadi et al. (2015)	No difference	Canada	1988–2008	67	1	0	0	0	1
31	Day et al. (2016)	No difference	Multi region	2008–2013	15	0	1	0	0	0
32	Belghitar et al. (2017)	No difference	UK	2001–2011	23	0	1	0	4	1
33	Rahman et al. (2017)	No difference	USA	2004–2013	67	1	1	0	2	1
34	Qiu et al. (2018)	Underperformance	USA	2001–2016	84	1	1	0	4	0
35	Matallín-Sáez et al. (2019)	No difference	USA	2000–2017	202	1	0	1	1	1

Table 6.8 Subsample of event analysis of SRI equity funds

#	*Author*	*Country of funds*	*Period of study*	*#SRI Funds*	*Free survivorship*	*Matching 1–1*	*Matching 1 vs many*	*# of matching criteria*	*Multi factor*
1	Nofsinger and Varma (2014)	USA	2000–2011	240	1	0	1	3	1
2	Becchetti et al. (2015)	Multi region	1992–2012	1213	1	0	1	3	1
3	Leite and Cortez (2015)	France	2001–2012	40	0	0	1	2	1
4	Gangi and Trotta (2015)	Europe	2008–2012	107	0	1	0	4	1
5	Lesser et al. (2016)	Multi region	2000–2012	213	1	0	1	3	1
6	Nakai et al. (2016)	Japan	2008	62	0	0	0	0	1
7	Arefeen and Shimada (2020)	Japan	2016	35	0	0	0	0	1

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*Articles in bold are part of the literature review sample

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CHAPTER 7

The Financial Side of the Social Impact Bond: The Determinants of the Returns

Rachele Hyerace, Maria Mazzuca, and Sabrina Ruberto

Introduction

SIBs are payment-by-results instruments through which a public commissioner assigns the delivery of a public service to a service provider. Investors pay the initial cost of the intervention and are repaid only if the project achieves the predetermined outcomes (monitored and measured by an external evaluator). The payments to the investors should derive

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from the cost savings of the public commissioner that in the future will not need to intervene to solve the social problem already mitigated by the SIB.

SIBs are investigated among scholars of different disciplines and the literature appears to be fragmented and the perspectives used multiple (Broccardo et al., 2020). Overall, the literature has emphasized some challenges that need to be faced for the SIBs to increase their possibility of spreading and developing (Broccardo & Mazzuca, 2021). Among these challenges, the "pure" financial aspects, such as the returns, are indicated as emergent issues. Using a financial lens, we investigate the following research question: which factors impact on the financial return of a SIB?

To answer the research question, we conduct an empirical analysis considering an extensive sample of 181 SIBs since 2010 and using an original dataset. The underlying hypothesis of the research question is that the SIBs diffusion also depends on their attractiveness for the investors that, in turn, typically depends on the (financial) return. However, given the specialness of the SIBs this return is blended with a social return. How much the investors are interested in the financial rather than in the social component of the return is not clear and it is still an open (empirical) question. Therefore, it becomes interesting to investigate the determinants of the financial return to shed light on the interest and role of the (traditional) finance in these (social finance) schemes.

This paper offers several contributions to the literature. First, it enriches the ongoing debate on how the payments-by-results schemes (and SIBs) contribute to solve social problems, both in developed and in developing countries. This debate is particularly appropriate in the case of projects that have some difficulties in being financed by traditional debt finance (Tortorice et al., 2020). Second, as the financial lens are used, this work contributes to enhancing our understanding of the determinants of the (financial) return in the SIBs. While de Gruyter et al. (2020) explore how SIBs align with investors' expectations and the conditions required to attract investors by developing a decision-making framework, to date no contribution explicitly investigates the determinants of financial return. To the best of our knowledge, only Del Giudice and Migliavacca (2019) empirically study the attractiveness of the SIBs for investors using an econometric approach, and specifically investigating which factors contribute to the institutional investors' participation. Least but not last, we build an original dataset that contributes to increasing the level of disclosure of SIBs and to feed the empirical research on SIBs that

has so far proved to be scarce and affected by several limits (also related to the scarcity of information).

The paper is structured as follows. In the second section, the sample, the variables used for the empirical analysis, and the estimating model are presented. In the third section, the results are discussed. In the final section, some concluding remarks are provided.

Empirical Strategy

Sample and Variables

We collect the data on SIBs and build the dataset manually. Data on SIBs can be found on different websites and on-online databases such as GOLAB, Social Finance and The Brookings Institution.

Our data collection ends in February 2021. In the beginning, our sample includes 210 SIBs. 5 SIBs are excluded immediately because the available information on them is almost absent. Successively, for each SIB in the list we search the data needed to construct the variables of the empirical analysis (see Table 7.1). We highlight that our updated dataset is original and partially manually constructed (Table 7.1).

To answer the research question, we consider the variables reported in Table 7.2 that offers a description of all the variables used in the empirical analysis and the motivations underlying (the expected sign of). More in detail, to investigate what factors impact on the financial return of a SIB, we use as a dependent variable the return promised to the investors (MRI).[1]

[1] Due to the paucity of data on the effective returns, we compute the variable MRI. The MRI is an estimated return calculated assuming that each SIB was a multi-year zero coupon bond. We argue that this hypothesis is plausible as most SIBs provide for the repayment of the principal plus the interests only upon reaching predetermined (minimum) levels of success of the project. The MRI is calculated as follows: $Max\,Return\,for\,Investors = \sqrt[t]{\left(\frac{Max\,Outcome\,Payment}{Capital\,Raised}\right)} - 1$, where t is the period of the SIB's implementation, and Max outcome payment is the maximum capital payment due to the investors (that has to be considered as a cap). Intuitively, the MRI is the maximum amount offered to investors (incorporating the repayment of the principal plus the interest). In an SIB the interest rate is often variable (within a certain range) and strictly dependent on the level of outcome achieved. This is why results based on the similarity hypothesis between a zero-coupon bond and an SIB must be considered with caution.

Table 7.1 Description of the sample by country (Panel A) and area of intervention (Panel B)

Country	*Number of SIBs*	*Average size (capital raised in Euro)*	*Average of cohort size*
Panel A—SIBs by country			
Argentina	1	1,470,611.00	1000
Australia	7	5,677,177.00	370.57
Austria	1	800,000.00	75
Belgium	1	234,000.00	180
Cambodia	1	8,932,559.00	1600
Cameroon	2	1,173,666.00	10,100
Canada	4	839,904.50	1800.25
Chile	1	241,622.70	11
Colombia	2	511,281.10	877.5
Finland	3	6,933,333.00	1400
France	9	1,694,444.00	1534.89
Germany	1	250,000.00	100
India	2	1,603,472.00	8650
Israel	3	3,503,634.00	1350
Japan	3	109,216.30	928
Netherlands	7	1,494,286.00	325.14
New Zealand	2	1,609,251.00	1330
Nigeria	1	17,400,000.00	3600
Palestine	1	1,607,861.00	1500
Peru	1	99,143.76	99
Portugal	12	279,758.70	8817.75
Russia	1	828,096.80	5000
South Africa	2	2,690,065.00	4000
South Korea	2	1,039,197.00	450
Sweden	1	1,056,089.00	–
Switzerland	1	2,528,327.00	120
Uganda	1	2,058,069.00	13,830
UK	80	1,313,544.00	1188.57
United Arab Em	1	476,789.90	25
USA	27	5,371,123.00	1109.81
Panel B—SIBs by area			
Policy area	*Number of SIBs*	*Average size (capital raised)*	*Average of cohort size*
Agriculture and environment	2	1,540,222.00	59.5

(continued)

Table 7.1 (continued)

Child and family welfare	34	2,268,549.00	320.73
Criminal justice	14	6,001,441.00	1331.71
Education	25	2,015,917.00	5603.83
Employment and training	50	1,552,692.00	1427.44
Health	27	1,841,039.00	2961.22
Homelessness	27	2,082,301.00	549
Poverty reduction	2	5,495,314.00	7715

Note All the amounts are expressed in Euro (exchange rates at the launch date of the SIBs)
Source Government Outcomes Lab (GoLab) Impact Bond dataset, Social Finance, The Brookings Institution, and SIBs' disclosed documentation, authors' calculations

As independent variables, we consider regressors aimed at capturing both the financial and the contractual characteristics of the SIBs. We include the financial variable MATURITY, measured by the logarithm of the maturity and its square to control for potential nonlinear effects. This variable corresponds to the years during which the project is implemented, and the investors are repaid.

To capture the contractual structure of the SIBs, we include the variable SIZE, measured by the logarithm of the size of the cohort of beneficiaries, the variable INVESTORS, measured by the logarithm of the number of investors participating in an SIB, a dummy variable CENTRAL, indicating the presence of a central government as an originator, and a dummy variable INTERMEDIARY, indicating the presence of an intermediary between the service provider and the investors. Finally, we include a dummy variable INSTITUTIONAL coded 1 if the SIB has at least one institutional investor.

Estimating Model

To investigate the determinants of the financial return we estimate the following equation:

$$\begin{aligned} MRI_i = {} & \alpha + \beta_1 MATURITY_i + \beta_2 MATURITY^2{}_i + \beta_3 SIZE_i \\ & + \beta_4 INVESTORS_i + \beta_5 CENTRAL_i + \beta_6 INTERMEDIARY_i \\ & + \beta_7 INSTITUTIONAL_i + e_i \end{aligned} \tag{7.1}$$

Table 7.2 Variables

Name	*Description*	*Motivation of the sign*	*Sign*
Dependent variable			
MRI	Return promised to the investors	Dependent variable	
Financial and contractual characteristics			
MATURITY	Term to maturity (years)	Positive yield curve hypothesis	+
SIZE	Nr. of beneficiaries (target population)	Larger projects are expected to be more complex	+
INVESTORS	Number of investors participating	Riskier projects are expected to be less attractive for the (mainstream) investors However, the sign also depends on the type of investors: riskier investors could be more interested in riskier SIBs, those promising a higher return Finally, the presence of a higher number of investors could be associated to larger (and more complex) projects	+/−
CENTRAL	Dummy = 1 if the originator is a central government	It could be intended as an implicit guarantee. It also could increase the agency problems	+/−
INTERMEDIARY	Dummy = 1 if there is an intermediary (between service provider and investors)	It mitigates the information asymmetries thus reducing the risk-return	−
INSTITUTIONAL	Dummy = 1 if there is at least one institutional investor	This type of investors is typically interested in less risky projects	−

where MRI is the return of SIB i promised to the investors. On the right-hand side, we include the variables specified in Table 7.2. Table 7.3 provides the summary statistics for the variables used in the analysis and Table 7.4 reports the correlation matrix.

The choice of the econometric method is primarily driven by the nature of the dependent variable. In particular, we adopt the nonlinear Beta regression model that accounts for the double boundedness of the response variable defined between 0 and 1 (excluding 0 and 1). Besides,

Table 7.3 Summary statistics of the variables

Variable	*Mean*	*Std. Dev*	*Min*	*Max*	*Obs*
MRI	0.21	0.21	0.005	0.64	181
MATURITY[(a)]	4.12	1.67	0.83	11	181
SIZE	1920.77	5659.46	10	55,000	180
INVESTORS	2.72	2.17	1	12	166
CENTRAL	0.41	0.49	0	1	181
INTERMEDIARY	0.72	0.45	0	1	179
INSTITUTIONAL	0.33	0.47	0	1	165

[(a)]in years. For the description of the variables, see Table 7.2.

as a robustness checks, we adopt the OLS model with the logistic transformation applied to the dependent variable as follows: $MRI^{LTR} = \ln [MRI /(1 - MRI)]$.

Using the Eq. (7.1) estimates obtained by applying OLS, the partial effect of MATURITY is computed conditional on its level as[2]:

$$\frac{\partial MRI}{\partial MATURITY} = \widehat{\beta_1} + 2 * \widehat{\beta_2} * MATURITY \tag{7.2}$$

and the relative standard errors as:

$$\widehat{\sigma}_{\frac{MRI}{MATURITY}} = \sqrt{var\left(\widehat{\beta_1}\right) + 4MATURITY^2 * var\left(\widehat{\beta_2}\right) + 4MATURITY * cov(\widehat{\beta_1}\widehat{\beta_2})} \tag{7.3}$$

The Determinants of the Returns: Results and Discussion

Table 7.5 reports the estimated results of Eq. (7.1).

According to the results in column 1, the effects of the variable MATURITY appear different according to its level, since while the variable MATURITY has a significant and positive effect on MRI, its

[2] We evaluate this estimated marginal effect by considering a linear estimation in order to avoid the complexities of interpreting interaction terms in nonlinear model (see Agostino et al., 2022).

Table 7.4 Correlation matrix

	MATURITY	*SIZE*	*INVESTORS*	*CENTRAL*	*INTERMEDIARY*	*INSTITUTIONAL*
MATURITY	1					
SIZE	−0.0909	1				
INVESTORS	0.0119	0.0024	1			
CENTRAL	0.2001	−0.1185	0.1161	1		
INTERMEDIARY	−0.0866	−0.1242	0.3546	0.0544	1	
INSTITUTIONAL	0.0055	−0.1177	0.3128	0.118	0.1596	1

For the description of the variables, see Table 7.2.

Table 7.5 Estimation results. Benchmark model and robustness checks

	1	*2*	*3*	*4*	*5*	*6*	*7*
	Benchmark	RETMRI instead of MRI	Country fixed effects	Area fixed effects	Year fixed effects	High-Income Countries	OLS
MATURITY	0.2355**	0.1567**	0.2759*	0.2699**	0.3032***	0.4021***	3.0327***
	0.025	*0.033*	*0.084*	*0.025*	*0.01*	*0.002*	*0.009*
$MATURITY^2$	−0.1051**	−0.0632**	−0.1390**	−0.1163**	−0.1260***	−0.1587***	−1.2472***
	0.016	*0.048*	*0.027*	*0.017*	*0.006*	*0.003*	*0.009*
SIZE	0.0150**	0.0124**	0.0004	0.0185**	0.0160**	0.0165**	0.1603*
	0.039	*0.037*	*0.981*	*0.027*	*0.036*	*0.044*	*0.071*
INVESTORS	0.0046	−0.0096	0.0360***	−0.0078	−0.0032	−0.0032	0.066
	0.786	*0.486*	*0.000*	*0.665*	*0.864*	*0.862*	*0.724*
CENTRAL	0.0489*	0.0340*	0.0291**	0.0520*	0.0457*	0.0419	0.5170*
	0.063	*0.081*	*0.015*	*0.052*	*0.083*	*0.13*	*0.06*
INTERMEDIARY	−0.0408	−0.0278	−0.0116	−0.0252	−0.0497*	−0.031	−0.4007
	0.179	*0.23*	*0.704*	*0.417*	*0.084*	*0.314*	*0.225*
INSTITUTIONAL	−0.0789***	−0.0333*	−0.0698***	−0.0733***	−0.0613**	−0.0851***	−0.9014***
	0.003	*0.091*	*0.002*	*0.007*	*0.028*	*0.002*	*0.003*
N.obs	162	162	162	162	162	146	162
Model test	33.497***	26.341***	3971.081***	58.012***	128.284***	33.358***	5.712***

For the description of the variables, see Table 7.2. In Italics are reported the p-values of the tests. Superscripts ***, ** and * denote statistical significance at the 1, 5, and 10 percent level, respectively. Standard errors (not reported) are robust to heteroskedasticity and autocorrelation. In columns 1–6, we apply the nonlinear Beta regression model where the dependent variable is MRI and we report the estimated marginal effects. In column 7, we apply OLS where the dependent variable is the logistic transformation of the variable MRI. The explanatory variables MATURITY, SIZE, and INVESTORS are in logarithmic form. The model test is the test of joint significance of all explanatory variables.

square parameter is negative and statistically significant.[3] The variable INVESTORS is not statistically related to return.

Looking at the contractual structure variables, most of them are statistically significant and their estimated coefficients are consistent with the expectations. The results in column 1 of Table 7.5 show that the estimated coefficient of the variable SIZE is positive and statistically significant, indicating that SIBs with a larger target population are associated with an higher financial return, probably due to the higher risks associated with the higher complexity. Also the estimated coefficient of the dummy variable CENTRAL is positive and statistically significant, suggesting that the presence of a central government increases yields, perhaps due to the potential more money availability or to the implicit guarantee recognized in the government's participation. Besides, the estimated coefficient of the dummy variable INSTITUTIONAL (gauging the difference in return between SIBs with at least one institutional investor and SIBs without institutional investors) is negative and statistically significant, suggesting that SIBs with at least one institutional investor are associated with a lower return. This result is consistent with our expectations and with the results of Del Giudice and Migliavacca (2019), that institutional investors are more attracted by less risky projects, those promising lower returns. The presence of an intermediary does not seem to have an effect, as the dummy INTERMEDIARY is not statistically significant.

To verify the sensitivity of our findings, we run a battery of robustness checks concerning the model specification, the estimation sample, and the methodology adopted. First, we consider an alternative measure of return, substituting MRI with a variable RETMRI that is the effective return subtitled with MRI when the former is missing. The results obtained are consistent, as shown in column 2 of Table 7.5. Second, to account for countries and area heterogeneity, and time effect, we estimate the benchmark model (Eq. 7.1) separately by including country, area, and year dummies.[4] The results, reported in columns 3–5 of Table 7.5, still support our main findings. Only for the regression including country dummies (column 3 of Table 7.5), the variable SIZE is no longer statistically significant. On the other hand, for this regression

[3] We will appraise the effect of this variable in a linear model reported below.

[4] To mitigate potential endogeneity issues, we include several fixed effects that may absorb factors that simultaneously affect the dependent variable and the potentially endogenous explanatory variables.

the variable INVESTORS is positive and statistically significant. For the regression including year dummies (column 5 of Table 7.5), the dummy variable INTERMEDIARY is negative and statistically significant. Third, since SIBs are more widespread in high-income countries, we restrict our analysis to these economies.[5] Looking at column 6 of Table 7.5, the estimation results confirm the robustness of the determinants MATURITY, SIZE, and INSTITUTIONAL that remain significant and with their sign even for this restricted sample, while the estimated coefficient of the dummy variable CENTRAL is not statistically significant.

As a robustness check on the estimation method, in column 7 of Table 7.5, we report the results obtained by adopting an OLS estimator. Such estimates confirm the previous findings. Moreover, as in the previous estimations results, the variable MATURITY has a significant and positive effect on MRI, while its square parameter is negative and statistically significant. However, since its effect on MRI is different in magnitude and in significance according to its level, we evaluate the estimated marginal impact of MATURITY conditional on its level by considering this estimation results obtained by applying OLS (column 7 of Table 7.5), where the dependent variable is the logistic transformation of the variable MRI. Being MATURITY a continuous variable, we adopt a graph (Fig. 7.1) where the marginal effect of MATURITY- and the relative confidence intervals - is shown across all the levels of MATURITY regressor, applying the formulas specified in the above section (Eqs. 7.2 and 7.3).

The continuous line in Fig. 7.1 shows the MATURITY marginal impact for all the values of the variable reported on the x-axis, while the dashed lines delimit 95% confidence intervals. According to Fig. 7.1, the effect of MATURITY on MRI seems dependent on MATURITY level. For SIBs characterized by short maturity (less than 2.7 years), representing about 13% of the estimated sample, the MATURITY estimated marginal effect is positive and statistically significant (the confidence band does not include the zero line). When MATURITY increase, the impact of MATURITY decreases, turning not statistically significant for about 53% of the sample observations, and turning negative and statistically significant for SIBs with a maturity greater than about 5 years (about

[5] We restrict our sample to the following countries: Australia, Austria, Belgium, Canada, Chile, Finland, France, Germany, Israel, Japan, the Netherlands, New Zealand, Portugal, Sweden, Switzerland, the United Kingdom, the United States and the United Arab Emirates, classified by the World Bank as high-income economies.

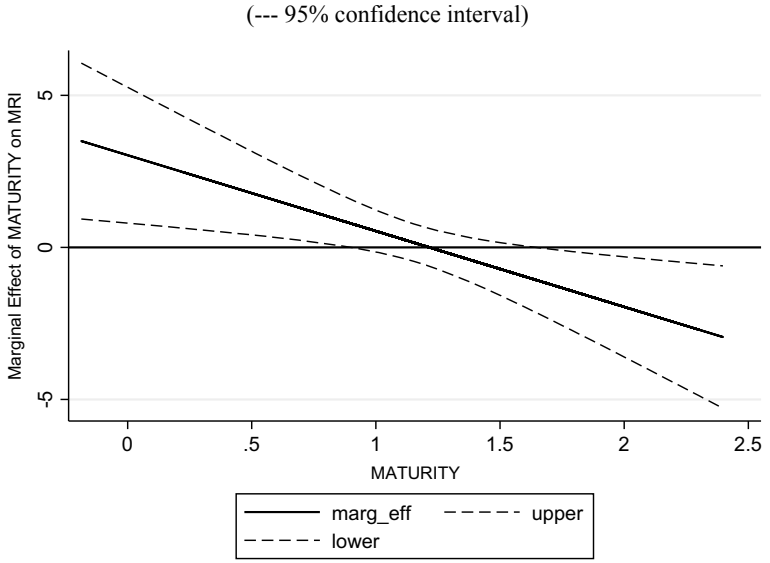

Fig. 7.1 Marginal effect of MATURITY on MRI as MATURITY changes

the 34% of the estimated sample). These results are very interesting from a financial point of view, and they contribute to enrich the debate about the presumably blended returns of the SIBs.

The positive relations evidenced for the shorter projects is consistent with the hypothesis on the positive inclination of the term structure. Less expected are the findings on the longer projects. In the case of the medium-term projects (less than 5 years), the returns prove to be affected by factors different than the maturity. Perhaps, in this case the contractual characteristics have a higher relevance in determining the returns. For the projects longer than 5 years, the unexpected negative relation between the maturity and the return could be justified by the fact that riskier projects (presumably characterized by low quality) are excluded from the long-term market as it happens to the loans with longer maturities that generally lead to greater credit risk but that are usually granted to less risky borrowers (Santos, 2011; Goss & Roberts, 2011; Drago & Gallo, 2017).

According to the evidence, robust to several sensitivity checks, the maturity of the project, the target population, the presence of a central

government as an originator, and the presence of at least one institutional investor seems to be the major determinants of the financial return.

Moreover, we estimate the benchmark Eq. (7.1) adopting a quantile regression to assess whether the influence of the determinants of financial return differs for SIBs with different risk-return profiles, considering SIBs belonging to the 25th, 50th and 75th percentiles of the MRI distribution.

The results, reported in Table 7.6 columns 1–3, highlight the impact of the determinants on financial return is evidently heterogeneous across the different level of return of the SIBs: the effectiveness of all determinants of the financial return considered is stronger for the first segment of the MRI distribution, hence for the less risky SIBs.[6] In particular, looking at the results concerning the less risky SIBs (reported in column 1 of Table 7.6) the estimated coefficient of the variable MATURITY is positive e statistically significant, while its square is negative and statistically significant.[7] Considering the contractual structure characteristics, the estimated parameters of the variables SIZE, INVESTORS, and CENTRAL are positive and statistically significant, while the estimated coefficients of the dummy variables INTERMEDIARY and INSTITUTIONAL are negative and statistically significant. Considering the second segment of the MRI distribution, except for the dummy variable INSTITUTIONAL, the other determinants lose significance, while for the last segment the determinants confirming their sign and significance are MATURITY and its square, the dummy variables CENTRAL and INSTITUTIONAL.[8] Overall, these findings suggest that for the riskier SIBs the ratio able to justify the level of the return tend to be disconnected from (at least)

[6] These results are also confirmed by the test, reported at the bottom of Table 7.6 column 2 that show the statistically significant differences in the estimated impact of all the determinants across different quantiles.

[7] When generating a graph analogous to Fig. 7.1 (and available upon request), the marginal effect of MATURITY on MRI for the sample belonging to the first 25th percentile of the MRI distribution is similar to the results mentioned above.

[8] Similarly, when generating a graph analogous to Fig. 7.1 (and available upon request) for the sample belonging to the first 75th percentile of the MRI distribution, it emerges that at low level of MATURITY, the effect of MATURITY is positive but not statistically significant. When MATURITY increases, the impact of MATURITY on MRI decreases, turning to be negative and statistically significant beyond a threshold value of about 5 years.

the general contractual characteristics. It could be plausible to imagine that these schemes function according to logics different from those driving the other financial schemes/instruments. It is plausible to imagine that the return is influenced by factors not specifically considered in the present analysis and not explicitly suggested by the previous (scant) empirical literature. For instance, these factors could include some political or reputational drivers.

Table 7.6 Estimation results: quantile regressions

	1	*2*	*3*
	q25	q50	q75
MATURITY	4.2844*	2.4339	4.6448**
	0.066	*0.311*	*0.047*
$MATURITY^2$	−1.9837**	−0.9877	−1.8399**
	0.049	*0.307*	*0.022*
SIZE	0.1911*	0.0846	−0.075
	0.061	*0.508*	*0.403*
INVESTORS	0.555**	0.1268	−0.1641
	0.05	*0.667*	*0.543*
CENTRAL	0.8803*	0.5118	0.613*
	0.052	*0.228*	*0.055*
INTERMEDIARY	−0.9947**	−0.6461	−0.2259
	0.049	*0.146*	*0.523*
INSTITUTIONAL	−1.3621***	−1.514***	−1.2907**
	0.001	*0.000*	*0.014*
N.obs	162		
R^2	0.122	0.135	0.111
test [q25 = q50 = q75]	2.2		
	0.01		

For the description of the variables, see Table 7.2. In Italics are reported the *p*-values of the tests. Superscripts ***, ** and * denote statistical significance at the 1, 5, and 10 percent level, respectively. The dependent variable is the logistic transformation of the variable MRI. The explanatory variables MATURITY, SIZE, and INVESTORS are in logarithmic form. According to the test reported at the bottom, differences in the estimated impact of all the determinants across different quantiles are significant.

Concluding Remarks

In this paper, we aim to shed light on the financial side of the Social Impact Bonds (SIB) by empirically investigating the determinants of the financial return of SIBs. We focus on an original sample of 181 SIBs since 2010, year when these schemes are introduced into the market.

The findings indicate that the effect of the maturity varies according to the same maturity of the project. Moreover, a larger target population and the presence of a central government increases yields, while the presence of at least one institutional investor seems to be associated with lower financial returns.

Our results are mixed and contribute to indicate that the hypotheses and the expectations about the returns and the overall functioning typically applied to the financial instruments cannot be suitable for the SIBs. The willingness to participate in a SIB and their implementation could be disconnected from their financial and (even) from their contractual characteristics; in this sense, these schemes could be useful in indicating the new frontiers of the finance.

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CHAPTER 8

Catastrophe Bonds: A Mitigation Opportunity in Turmoil Period

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Introduction

"*Between 1970 and 2019, 11,072 disasters have been attributed to weather, climate and water related hazards, involving 2.06 million deaths and US$ 3,640 billion in economic losses. Disasters involving weather, water and climate hazards constitute 79% of disasters, 56% of deaths and 75% of the economic losses involved in all disasters related to natural hazard events reported over the last 50 years*". These are the updated and significantly

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alarming data disclosed in the State of Climate Services 2020 Report published by the World Meteorological Organization (WMO).

In the last few years natural catastrophes have led to the search for alternative instruments as effective solutions for financial risk management, allowing to transfer the risk directly to the financial market. In this sense, Catastrophe bonds (Cat bonds) partially or fully transfer the insured risk from insurance and reinsurance companies to the capital market, in the case of events characterized by very low frequency and very high severity.

Cat bonds duration spans from three to five years, in which the returns are related to the potential risk of loss attributable to a specific period, geographical area or a particular type of disaster. When a "trigger event" occurs, the bond capital is used to meet the claims for compensation.

Different trigger types exist in Cat bonds structures, such as indemnity triggers, index triggers and hybrid triggers. The size of the sponsor's effective losses determines payouts in indemnity triggers; while for index triggers, payouts are based on an index not directly linked to the sponsor losses, lastly more triggers are considered simultaneously in hybrid triggers system.

Since the first issuance of Cat bonds in the mid-1990s by Hannover Re for an amount of 85 million dollars, Cat bonds have been the object of investigation in terms of portfolio diversification opportunities for investors (Mariani & Amoruso, 2016; Pizzutilo & Venezia, 2018).

The growing interest in Cat bonds and related insurance-linked securities (ILS) has lead to the record of $16 billion of annual issuance in 2020. The exponential demand for Cat bonds could be attributed to different factors as the unexpected pandemic emergency as well as the peculiarities of this asset class in terms of diversification. Indeed, they show zero or minimal correlation with markets and these instruments could narrow the gap between insured and uninsured catastrophes losses that burden governments, businesses, communities and individuals.

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This work advances a quantitative analysis, comparing Cat bonds market trends and their potential adoption as diversification tools in traditional portfolios composed by bonds, equity, real estate and commodities. The rationale of these further investigations lies in the aim of verifying if market turmoil and consequent downturns could alter the potential of Cat bonds in portfolio diversification and risk mitigation. Indeed, the ambitious goal of this work is to investigate if the zero or minimal correlation of Cat bonds with other financial assets resists independently from the specific economic context.

First, consistently with literature, the correlation properties of Cat bonds are tested in different samples, considering the whole period from 2002 to 2021 and the turmoil periods, namely the great financial crisis and the pandemic crisis, having this last one a peculiar origin outside the markets. The analysis illustrates the minimal correlation of Cat bonds with traditional asset classes, increased during the great financial crisis. Conversely, zero-correlation has been found during the pandemic period. Similarly, considering the annualized volatility, Cat bonds are affected to a smaller extent during the great financial crisis, while no significant impact emerges from the pandemic crisis, differently from what occurs for traditional asset classes.

This first insight about the strength of Cat bonds diversification opportunities is then tested by a portfolio optimization analyses, comparing the performance metrics of portfolios composed by traditional asset classes and to portfolios including Cat bonds at different levels.

In this sense, the paper proves the resilient and beneficial effects in terms of diversification strategy but in a rationally constrained context. In other words, caution is required to handle the inclusion of such peculiar instruments in traditional portfolios in the light of the inner characteristics of the instruments in terms of illiquidity, high exposure to natural disaster risks and small markets.

In terms of practical contributions, this paper aims at offering a new perspective towards dealing with climate risk, given the growing occurrence of natural disasters, by the means of specific instruments, as Cat bonds, to mitigate them while acting, under certain circumstances, as a beneficial asset class both to policymakers and investors.

The rest of the paper is organized as follows: Sect. "Literature Review and Hypothesis Development" explores the literature on the topic, Sects. "Data" and "Methodology" explore, respectively, the data analysed and the methodologies applied. Section "Results and Discussion"

deepens the analysis moving from an exploration of descriptive statistics and linear modelling to the development of an effective portfolio diversification strategy with the inclusion of Cat bonds. Section "Conclusions" concludes.

Literature Review and Hypothesis Development

A catastrophe bond can be generally identified as "*a security which pays regular coupons to the investor unless a catastrophic event occurs, leading to full or partial loss of principal. The principal is held by a special purpose vehicle (SPV) in the form of highly-rated securities and paid out to the hedging (re)insurer to cover its losses if the trigger condition, which has been defined in the bond indenture, is fulfilled*" (Braun, 2011). Cat bonds, on the other hand, are default-free with full collateralization and are traded on capital markets, offering transparency, liquidity and diversification to investors (Zhao & Yu, 2019).

The structure of catastrophe bonds allows for reducing the exposure of investors from market-related risks maintaining the exposure to risk associated with the trigger events (Carayannopoulos & Perez, 2015).

As highlighted by Cummins (2008), catastrophe bonds and other risk-linked securities represent innovative tools to sell insurance risk to capital markets and collect funds to use for claims derived from catastrophic events and other loss events. Cat bond is classified as "*a fully collateralized instrument that pays off on the occurrence of a defined catastrophic event*".

Previous studies have mainly focused on factors that affect the pricing of Cat bonds considering both the financial factors as in the case of traditional bonds and the association of these instruments with catastrophic events (Braun, 2016; Gürtler et al., 2016; Lei et al., 2008; Mariani et al., 2018).

One of the pioneer studies in this field is attributable to Lane (2000) that advanced a power function with two parameters (the probability of first loss and the conditional expected loss) with reference to a very limited sample of Cat bonds for the year 1999. Lei et al. (2008) implemented a linear model on a sample of 177 primary market deals, within the timeframe from 1997 to 2007 and focused on the probability of exhaustion and transaction-specific characteristics such as maturity, issue size, trigger type and rating. Papachristou (2011) applied a Generalized Additive Model on a sample of 192 bonds, issued between 2003 and 2008,

in order to analyse the factors able to affect the price of Cat bonds in the primary market.

The author argued that factors such as expected loss, perils and territories covered, reinsurance cycle and type of trigger drive the price of Cat bonds. In the same vein, Braun (2016) investigated the main determinants of the Cat bond spread at issuance underlining the significance of the expected loss as well as covered territory, sponsor, reinsurance cycle and the spreads on comparable rated corporate bonds.

Similarly, Mariani et al. (2018) focused on the primary market and explored a sample of 47 Cat bonds issued within the timeframe 2011–2015 in order to identify potential spread determinants. The authors demonstrated the significance of Libor, included in the analysis as representative of the traditional market, in explaining Cat bond spread in the primary market.

With reference to the secondary market, Dieckmann (2010) analysed a sample of 61 Cat bonds considering the occurrence of Hurricane Katrina in August 2005 as a key moment, with the aim of investigating both the spread drivers and the impact of such catastrophic events on pricing dynamics. Furthermore, Gürtler et al. (2016) applied panel data methodology to evaluate how Cat bonds react after the financial crisis or a natural catastrophe such as Hurricane Katrina.

Recently, Chang et al. (2020) tested the predictive power of catastrophe bond spreads in predicting windstorm and hurricane arrival frequencies. From an initial sample of primary market data for Cat bonds over the years 1997–2013.

Zhao and Yu (2019) stressed, analysing the Cat bond market, the higher average Cat bond liquidity premium compared to the traditional corporate bond. Furthermore, the authors demonstrated a relevant increase in the liquidity premium in correspondence with events such as natural catastrophes and the 2008 financial crisis. In this perspective, Cat bonds markets are conceivable instruments of market prediction as they properly combine information about future "cat" losses (Zhao & Yu, 2020).

Diversely, Götze and Gürtler (2020) focused on the impact of sponsor characteristics on the Cat bonds premium and stressed the presence of inefficiencies in Cat bonds secondary markets, in particular during hard and neutral phases compared to soft market phases.

Concerning the peculiarities of Cat bonds in terms of portfolio diversification opportunities, previous studies (e.g. Carayannopoulos & Perez,

2015; Litzenberger et al., 1996) defined Cat bonds as "zero-beta" investments, an expression that remarkably emphasizes the zero or minimal correlation with markets. In this perspective, to investigate the attractiveness of Cat bonds as investments, Cummins and Weiss (2009) examined the effect of the financial crisis on Cat bonds returns. The authors argued that during the normal market conditions Cat bonds present almost no correlation with stocks and bonds returns, while during the crisis a significant correlation is registered between Cat bonds returns and these markets. Similarly, Carayannopoulos and Perez (2015) evaluated the effectiveness of Cat bonds as diversification instruments during the financial crisis and confirmed this evidence. However, the authors stressed how the effect of financial crisis is lower in the case of Cat bonds, indeed Cat bond betas returned to pre-crisis.

In the same vein, Mariani and Amoruso (2016) highlighted the scarce dependence existing between the Cat bonds segment and the traditional market. In addition, the authors remarked that Cat bonds present lesser volatility as well as fairly stable returns. Notwithstanding the remarkably particular characteristics of Cat bonds, little attention has been paid to the potential of adopting these financial instruments for diversification purposes.

In this sense, Demers-Bélanger and Lai (2020) simulated on a sample period spanning from 2002 to 2017 portfolios with and without Cat bonds, with controversial results. Indeed, despite diversification benefits are tangible in period of crisis, as during the great financial crisis, they tend to be dependent on the different market conditions. More specifically, Drobetz et al. (2020) on a similar timeframe, using weekly data distinguished between Cat bonds behaviour as diversifier, hedge instrument or safe heaven assets, providing evidence of diversification benefits, despite the rejection of safe heaven properties of the instruments in context of extreme traditional kind market declines.

In the light of the literature background, the novelty of this investigation stands in the purpose of verifying if the no (or minimal) correlation of Cat bonds with other financial assets exists independently of the specific economic context, and how this aspect turns to be valuable in a context of portfolio diversification and to what extent it occurs.

In particular, the analysis will also be performed with reference to the recent Covid-19 crisis in order to provide insights towards the resilience of Cat bonds peculiarities, such as the absence of correlation of Cat bonds

with the counterparts, even with reference to such context of economic turmoil.

Data

All the data are retrieved from the Bloomberg Professional Database on a weekly basis, and they track a timeframe from January 2002 to October 2021. Log gross returns have been computed in place of simple returns in order to take benefits from the statistical properties of logarithms in handling with data. Indeed, the smaller the returns, the more log returns represent a suitable approximation to net returns, and they are calculated in the following way:

$$r_t = ln(1 + R_t) = ln\frac{P_t}{P_{t-1}} = p_t - p_{t-1}, \tag{8.1}$$

where $p_t = ln(P_t)$

Similarly, the standard deviation of asset returns has been multiplied by $\sqrt{52}$ to annualize the risk measure, facilitating the comparability across the asset classes considered. In this sense, it represents the risk related to the variables analysed and it has been computed as follows:

$$\widehat{\sigma} = \sqrt{\frac{1}{T-1}\sum_t^T (r_t - \mu)^2} \tag{8.2}$$

The sample is based on the following five different indices:

- Swiss Re Global Cat Bond Total Return Index which is a market value-weighted basket of natural catastrophe bonds trailed by Swiss Re Capital Markets;
- Barclays Capital U.S. Aggregate Bond Index which measures the performances of investment or higher-grade bonds, including a large spectrum of securities in the United States such as government, corporate and international dollar-based bonds;
- Barclays Capital U.S. Corporate High Yield Bond Index which represents the riskier segment of corporate issuance;
- S&P500 Total Return Index which represents the 500-leading large-cap U.S. equities, covering approximately 80% of available market capitalization;

Table 8.1 Variable description

Index	*Type*	*Currency*	*Duration*
Swiss Re Global Cat Bond Total Return Index	Bond	USD	4 years
Barclays Capital U.S. Aggregate Bond index	Bond	USD	5 years
Barclays Capital U.S. Corporate High Yield Bond Index	Bond	USD	4 years
S&P500 Total Return Index	Equity	USD	N.A.
S&P GSCI	Commodity	USD	N.A.
Dow Jones U.S. Real Estate Total Return Index	Real Estate	USD	N.A.

- S&P GSCI which represents the global commodity market segment; and
- Dow Jones U.S. Real Estate Total Return Index which collects the performance of real estate investment trusts (REIT) and other companies investing directly or indirectly in this market segment, including property agencies (Table 8.1).

In order to test the resilience of Cat bonds peculiarities, the analysis has been carried out taking into account the whole sample and the two main crises, namely the great financial crisis and the more recent pandemic crisis.

Methodology

The aim of the analysis is to investigate the extent to which Cat bonds performance can be traced by the means of traditional asset classes, such as stocks, bonds, commodities and real estate segments as predictors of Cat bonds performances in different economic contexts. In this vein, the first part of the paper is focused on descriptive statistics of returns of each index. In particular, the distribution of returns, correlation matrices and volatility related to each asset class has been deeply investigated in different timeframes. At this stage, the aim is twofold, namely verifying the low correlation (if any) of Cat bonds with traditional asset classes and the lower Cat bonds volatility in different economic contexts. In other words, the employability of Cat bonds in investment diversification strategy has been explored.

Regression Analysis and Mean–Variance Spanning Test

At this stage, the analysis investigates the independence of Cat bonds compared to traditional asset classes, through linear regressions carried out on various sub-samples. In this perspective, the goal is to prove the low significance of predictors, if any, across different contexts of time to consistently provide evidence concerning such independence. The regression could be formulated as follows:

$$CatBond_i = intercept + \sum_{k=1}^{K} \beta_k TraditionalAssets_k + \varepsilon \tag{8.3}$$

To verify the validity of the model Cook's Distance is adopted, removing data points which negatively affect the regression models. Indeed, the larger is the distance, the stronger is the influence of that point on the results of the regression. Going into detail, as rule of application, any point with a distance over than the value of 4/n, where n is the total amount of data, is assumed to be an outlier (Cook & Weisberg, 1982).

In this sense, a further element of the analysis consists of the spanning tests introduced by Huberman and Kandel (1987) to evaluate the diversification benefits deriving from the inclusion of Cat bonds in the traditional portfolio, within the specific context of pandemic crisis. In this sense, the test examines if the payoff of an asset can be replicated or spanned in mean–variance frontier by a set of benchmark asset K. In other words, the potential benefit for an investor in including Cat bonds in portfolio is tested. This analysis can be represented by the following formula:

$$R_{test,t} = a + \sum_{k=1}^{K} \beta_k + \varepsilon_t \text{ with} \tag{8.4}$$

$$H_0 : a = 0, \sum_{k=1}^{K} \beta_k = 1 \tag{8.5}$$

Under the null hypothesis, therefore, the portfolio composed by K benchmark assets tracks the same expected returns but with lower variance being uncorrelated with the error term ε_t, than the portfolio including

Cat bonds. To test the hypothesis, a Wald test has been carried out under the assumption that ε_t are independent and identically distributed, as in the formula:

$$W = T(\lambda_1 + \lambda_2) \sim \chi_2^2$$

in which $\lambda_1 = \max_r \frac{1+\widehat{\theta}_2^2(r)}{1+\widehat{\theta}_1^2(r)} - 1$, and $\lambda_2 = \min_r \frac{1+\widehat{\theta}_2^2(r)}{1+\widehat{\theta}_1^2(r)} - 1$,

where $\widehat{\theta}_1^2(r)$ *and* $\widehat{\theta}_2^2(r)$ represent the Sharpe ratios obtained for the two portfolios analysed. Conversely, under the assumption of conditional heteroskedasticity the generalized method of moments (GMM) estimator is better suited, as by Kan and Zhou (2012), using the same regression framework.

Portfolios Simulation

The last part of the analysis is based on the actual implementation of a diversification strategy, including Cat bonds in portfolios composed by traditional asset classes, providing further insight towards the robustness of this alternative market instrument and its independence to traditional asset classes, even more in a context of economic turmoil, as in pandemic period.

The first step is the identification of a benchmark portfolio with traditional asset classes only and the following comparison with a portfolio including Cat bonds, with three different weights constraints, namely 10%, 15% and 20% as maximum weight of Cat bonds position in the selected portfolios. Furthermore, additional constraints have been added, indeed, it is not allowed to assume short position against the asset in portfolio and the sum of the weights must be equal to 1.

The objective pursued by the portfolios is to minimize portfolio variance according to Markowitz Mean–Variance model. In other words, at each time period the investor can modify the weights (w) within the portfolio to minimize variance. This is a quadratic problem in the form of:

$$\min_w w_t' \sum w_t \tag{8.6}$$

where $E[r_p] = w_t'\mu = \overline{\mu_t}$, Σ is the variance–covariance matrix of asset returns, r_p is the $N \times 1$ vector of portfolio returns, $\overline{\mu_t}$ the desired

expected return for the portfolio, $w_t e = 1$, assuming to invest all the wealth and e is an $N \times 1$ vector of ones. Therefore, the first step involves the identification of the optimal weight referred to the desired expected return which is equal to:

$$w^* = \frac{\overline{\mu_t}}{\overline{\mu_t}\Sigma_t^{-1}\overline{\mu_t}}\Sigma_t^{-1}\overline{\mu} \tag{8.7}$$

Once determined the weights to obtain the desired expected return, it is possible to determine the optimal weights to minimize variance as follows:

$$w^* = \frac{1}{e'\Sigma_t^{-1}e_t}\Sigma_t^{-1}e \tag{8.8}$$

In this sense, a dynamic approach has been carried out. In particular, the aim of the paper is to test the resilience of Cat bonds as diversification instrument in the context of pandemic crisis. This last is a peculiar crisis arising outside the market differently respect to what occurred during traditional market crises, as the great financial crisis.

In this sense, assuming a data series of T observations, data spanning from 1 to K are used to train the portfolio in selecting the weights for the period $[K, K + 3]$. Starting from these weights, it is possible to calculate portfolio realized returns multiplying them times the observed returns for that period. The same procedure has been carried out assuming a rebalancing period every three weeks, up to the end of sample T. Thus, the portfolio returns obtained are a series of T-K observation both starting from 17 January 2003 to October 2021 and from 3 January 2020 to 29 October 2021, adopting a $K = 52$, thus using as training period for the portfolio weights, respectively, for the whole 2002 and 2019 data.

Results and Discussion

Descriptive Statistics

In this section, a variety of descriptive statistics is provided. Going into details, as shown in Table 8.2 the average return is positive for all the indices included in the whole sample except for the Commodity index. In this sense, Cat bonds returns are equal to 0.1275% in average, below the average returns of the equity segment, real estate segment and the riskier corporate segment. However, Cat bonds show an average return close to

the median value in contrast with other indices, resulting in a first representation of lower volatility in the timeframe. In other words, these values provide evidence of the inherent illiquidity of Cat bonds, even if the values of standard deviation stress possible advantages in terms of diversification in a portfolio based on traditional assets. Indeed, comparing the standard deviation of the asset classes, the Cat bonds record a risk measure equal to 0.5% far below the traditional instruments as for S&P500, Dow Jones Real Estate and the commodity segment, respectively, equal to 2.43%, 3.47% and 3.23%.

In line with these results, even the skewness is slightly negative and lower than in the counterparts. Furthermore, the high value in terms of Kurtosis represents an intriguing aspect in terms of higher dispersion of Cat bonds returns across the mean value, with information in the fat tails of the distribution. It is related to the occurrence of specific events such as Hurricane Katrina in August 2005 and natural disasters occurrence such as earthquakes in Mexico, Maria and Harvey hurricanes in 2007.

Moreover, this consideration is also strengthened by the minimum return recorded by Cat bonds in 2007, equal to −16.61% in pair with the maximum value recorded in the same period as further proof of the high volatility recorded in such year by the insurance instrument.

Along the same path, comparing the minimum and the maximum returns value of the other asset classes, the comparison confirms, at first glance, the absence of correlation with market dynamics or at least a lower impact of them on Cat bonds returns.

With reference to the other asset classes, as expected, the less volatile variable is the Aggregate Bond index, which records its lowest and highest return during the pandemic period, in the first quarter of 2020.

The other indices, in line with the expectations, show the minimum values in the occurrence of financial crisis of 2008, instead. The only exception is represented by the Dow Jones U.S. Real Estate, which reached the lowest peak similar to the Aggregate Bonds, presumably due to the investors' reaction to the financial crisis originated by the restriction imposed by governments as response to pandemic.

Going forward, during the Great Financial Crisis (GFC) spanning from June 2007 to July 2009 (Carayannopoulos & Perez, 2015; Cummins & Weiss, 2009), the average returns of Cat bonds is identical to the whole sample, equal to 0.1276% close to the median value, with a standard deviation equal to 0.3859%.

Table 8.2 Weekly return descriptive statistics

	Weekly Returns—Whole Sample									
Index	*Num. Obs*	*Average Return %*	*Median %*	*Std. Dev. %*	*Skewness*	*Kurtosis*	*Min %*	*Date*	*Max %*	*Date*
Cat Bond	1034	0.1275	0.1390	0.7005	−9.7972	368.340	−16.6100	08/09/2017	10.9220	15/09/2017
Aggregate Bond Index	1034	0.0821	0.1085	0.5009	−0.6155	3.4340	−3.2180	13/03/2020	2.6200	27/03/2020
High Yield Bond Index	1034	0.1447	0.2145	1.0912	−2.7936	30.0350	−11.3010	10/10/2008	5.7570	09/01/2009
S&P500	1034	0.1703	0.2950	2.4325	−1.0021	8.9959	−20.0170	10/10/2008	11.4620	10/04/2020
Dow Jones US Real Estate	1034	0.1842	0.3890	3.4773	−0.7202	11.9313	−28.3160	20/03/2020	20.4170	10/04/2020
S&P GSCI index	1034	−0.0013	0.2105	3.2313	−0.9308	3.5695	−21.1350	05/12/2008	12.1310	02/01/2009
Weekly Returns—Great Financial Crisis Sample										
Cat Bond	104	0.1276	0.1585	0.3859	−3.9688	23.6639	−2.4700	10/10/2008	0.9790	07/09/2007
Aggregate Bond Index	104	0.1263	0.2335	0.6677	−0.5002	0.4872	−1.9950	10/10/2008	1.6790	19/12/2008
High Yield Bond Index	104	0.0421	0.1465	2.2220	−1.5874	7.4052	−11.3010	10/10/2008	5.7570	09/01/2009
S&P500	104	−0.3127	−0.1120	4.2335	−0.6562	3.9098	−20.0170	10/10/2008	11.4150	28/11/2008

(continued)

Table 8.2 (continued)

Index	*Num. Obs*	*Average Return %*	*Median %*	*Std. Dev. %*	*Skewness*	*Kurtosis*	*Min %*	*Date*	*Max %*	*Date*
	Weekly Returns—Whole Sample									
Dow Jones US Real Estate	104	−0.5260	−0.1270	7.0717	−0.0923	1.2644	−19.5390	21/11/2008	20.3550	28/11/2008
S&P GSCI index	104	−0.3539	0.3500	5.1779	−0.9355	1.9451	−21.1350	05/12/2008	12.1310	02/01/2009
Weekly Returns—Pandemic Crisis Sample										
Cat Bond	95	0.1005	0.1260	0.2652	−1.2676	4.7177	−0.9750	27/03/2020	0.9500	24/09/2021
U.S. Aggregate Bond Index	95	0.0537	0.1140	0.6531	−0.9829	9.0170	−3.2180	13/03/2020	2.6200	27/03/2020
High Yield Bond Index	95	0.1152	0.1160	1.7460	−2.8219	−1.2953	−10.7250	20/03/2020	5.1950	10/04/2020
S&P500	95	0.4031	0.7620	3.4667	17.9662	7.0778	−16.1950	20/03/2020	11.4620	10/04/2020
Dow Jones US Real Estate	95	0.2230	0.3650	5.1753	−1.2228	11.0361	−28.3160	20/03/2020	20.4170	10/04/2020
S&P GSCI index	95	0.0981	0.8130	3.9059	−1.4453	3.2787	−15.4620	13/03/2020	6.9770	08/05/2020

As food for thought, the Aggregate bonds record the same average return despite a standard deviation of almost doubled equal to 0.6677%. As expected, the other asset classes are hugely affected by the market turmoil, with equity index, real estate and commodity which record negative average returns and the highest risk, respectively, equal to 4.23%, 7% and 5,2%. Furthermore, as expected the skewness values related to each asset class are negative, highlighting the negative effect on returns distributions of the financial market crisis.

Lastly, with reference to the Pandemic Crisis spanning from 2020 to 2021, Cat bonds average return is equal to 0.10%, slightly on the left side of the median value equal to 0.1260%. The first observation to be made is that compared to the other periods, the average return is almost identical. Similarly, to what occurred in the GFC period, the standard deviation, equal to 0.2652%, is far below the risk measures related to the counterparts, as in the case of 3.4667% of S&P500 and 5.1753% of Dow Jones Real Estate, which in turns are reflected in the wide gaps between minimum and maximum return values across March and April 2020.

Investigating the market segment trends, fixing the starting price at base 100 in order to ensure a higher level of comparability across the asset classes, it could be asserted that the Cat Bond Index trend (Fig. 8.1) provides additional evidence of independence compared to other asset classes considered.

As a matter of fact, despite the corporate real estate segments show the highest value as of October 2021, it is evident that this upward movement is affected by the financial turmoil in markets in 2008–2009, the pandemic crisis across 2020 and the following rally on the markets starting in April 2020.

In addition, with the announcement of Covid-19 vaccine in November 2020, a further upward movement is recorded by the traditional asset classes, namely real estate, equity and on a lower degree the High Yield segment.

Conversely, Cat bonds, similar to the investment grade segment, are barely affected by such events, with only a slight decline in 2017 as mentioned before. This scenario appears consistent with the rationale of offering an effective portfolio diversification by inserting alternative asset classes as Cat bonds in a traditional portfolio.

As food for thought, the S&P GSCI, formerly Goldman Sachs Commodity Index, records a downturn movement across the years as a

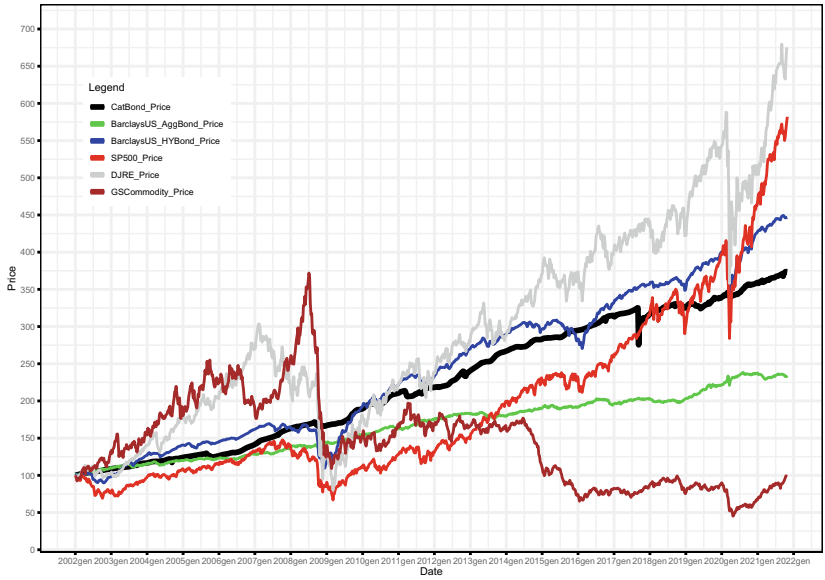

Fig. 8.1 Comparative index as of October 2021. Base = 100

consequence of the GFC peak with a slight increase in the last semester of 2021, following the inflation movements.

Observing the distribution of returns (Fig. 8.2), Cat bonds returns appear stationary throughout the whole sample, apart from 2005 and 2017 due to the occurrence of some triggers event, such as hurricane Katrina in 2005, the financial crisis in 2008, the post-financial crisis due to the low-interest-rate, the occurrence of natural disaster across 2017. In this sense, it could be fruitful to highlight the stability of the returns series with specific reference to the pandemic period, providing further insight already at this stage of the analysis of possible benefits in terms of diversification.

Therefore, Cat Bond Index is impacted by the downturn movement of economy as the GFC, across 2007 and 2009, but to a lesser extent than the considerable effect represented by the fluctuations of High Yield segment as well as equity, real estate and commodity indices. Similarly, the investment grade securities record a trend similar to Cat bonds, barely affected by market turmoil apart from the GFC period and pandemic.

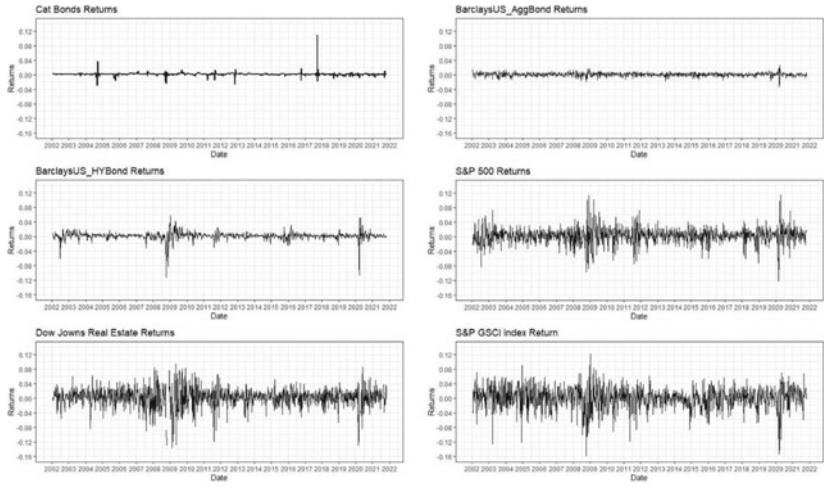

Fig. 8.2 Monthly index returns, as of October 2021

With regard to annualized returns (Fig. 8.3), Cat bonds provide a stable payoff throughout the whole sample, recording annualized returns always below 10%, due to the illiquidity of the instrument compared to other more volatile asset classes. Indeed, High Yield segment spans from −35% at the end of 2008 to +50% the following year. Similarly, to a lower extent, the equity segment records a similar pattern with the addition of a negative peak at the end of 2002 as consequence of the *dot.com* bubble in the previous period.

In this sense, Aggregate bonds and Cat bonds are the unique asset classes to perform positively throughout the whole sample, in particular during GFC and pandemic it could be asserted that the annualized returns of the alternative asset classes are equal or higher than the investment grade related returns, providing further insight of beneficial effects in terms of portfolio diversification.

In the same vein, the boxplots of returns (Fig. 8.4) clearly show that the distribution of Cat bond returns is really close to the mean values, also taking into account the quartiles of the distribution. The value of outliers is more pronounced in the occurrence of specific trigger events, remarkably in 2005, in 2017 as well as the one in 2011. Comparing the boxplot of the other variables, the distribution of investment grade

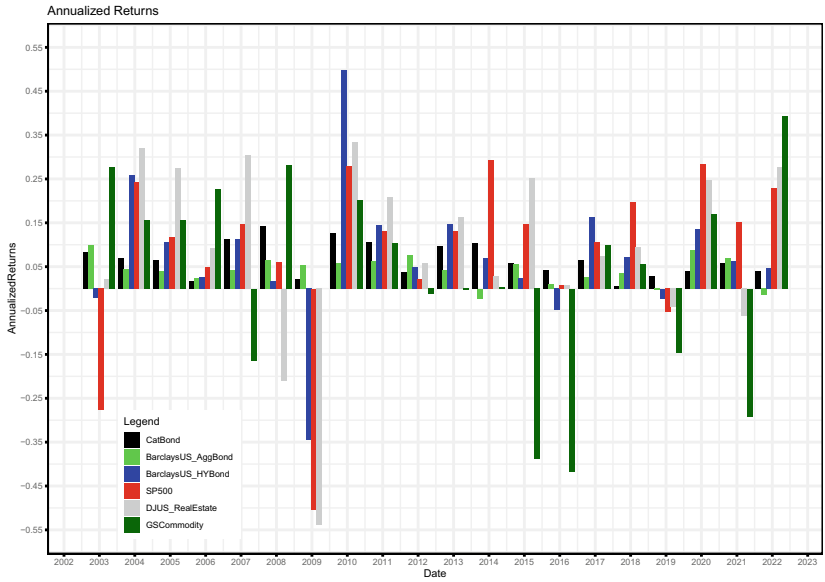

Fig. 8.3 Annual index returns 2002–2021

segment depicts only a few negative outliers with the occurrence of GFC and a more volatile distribution during 2020 due to the outbreak of pandemic and the following rally in the second part of the year. As expected during the GFC and the pandemic crisis in 2020, the Cat bonds show an intrinsic resilience to these events which remarkably affect the other variables considered.

Going into detail, in 2008, as expected the most affected market segment was the equity one, even considering the real estate segment whose quartiles cover a range of returns, respectively, from −0.09 to −0.06 and from −0.15 to 0.16. In both cases even the median is negative across all the years involved. Negative results are performed also by the High Yield segment, with a negative median and a distribution which shows a heavy left tail.

Conversely, with reference to 2020 the outliers are distributed in both lower and upper bounds of distribution of traditional asset classes as consequences of the initial drop followed by the rally in the second part of the year.

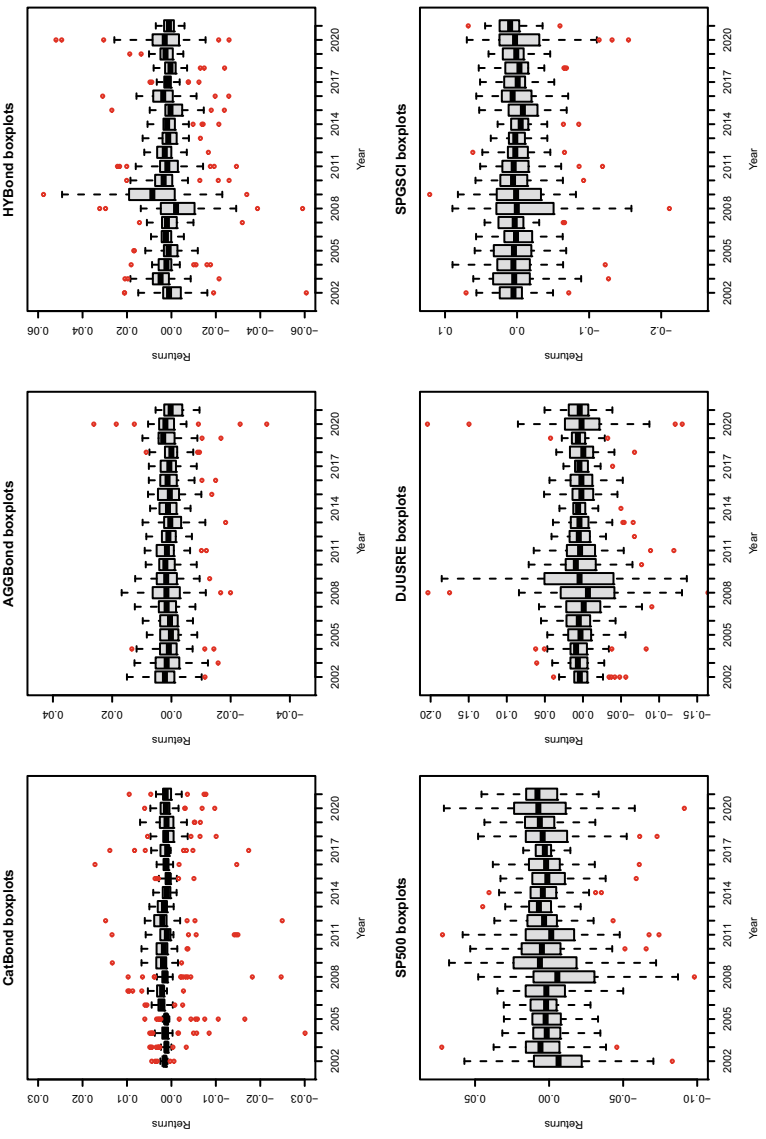

Fig. 8.4 Variables boxplot

In other words, conversely to what shown in Cat Bonds boxplots, during financial crises traditional asset classes recorded a much wider volatility, to which it is possible to derive the huge impact of such economic turmoil on these segments.

In this context, instead, Cat bonds show a positive mean value despite the occurrence of some outliers in 2008. In this scenario, it is undeniable an effect of GFC on Cat bonds returns, as well as their resilience, compared to other segments at the same time.

This no correlation is also evident in 2020 when the distribution of Cat bonds remains close to median, despite a left tail more pronounced than its counterpart on the right. Diversely, it is observed in the corporate segments, as well as in the other indices a huge left tail, replicating the excessive volatility that occurred in 2008.

To further check the characteristics of already analysed Cat bonds, the following step has been focusing on the comparison of volatility, splitting the sample into two sub-samples, to verify the effect of financial crisis on the annualized standard deviation of each variable.

As shown in Fig. 8.5 two breaks are settled, the first puts an end to the first period of analysis in July 2007, in line with previous studies as starting point of the GFC (Carayannopoulos & Perez, 2015; Cummins & Weiss, 2009), ending in July 2009. Furthermore, the Covid-19 period is highlighted in order to have further insight into the lower volatility of Cat bonds returns compared to traditional asset classes.

In the timeframe related to the GFC the turmoil caused by the financial crisis in the two years period barely affects the volatility of Cat bonds returns differently from what appears in the other variables, included the investment grade segment. In fact, the annualized standard deviation in the GFC period for Cat bonds is equal to 2.78%, compared to the value related to the whole period equal to 5%, hugely affected by 2005 and 2017. With reference to the pandemic, the standard deviation is even lower, equal to 1.9%, while in the same period the investment grade component records a standard deviation equal to 4.7%.

In this sense, despite the increased volatility with GFC compared to previous years, apart from 2005, the annualized standard deviation is mostly affected by the excessive volatility recorded in 2017, a critical year for this alternative asset class.

For traditional asset classes, the riskier corporate segment almost doubles its volatility in crisis period, similar to S&P500, Dow Jones Real Estate and commodity index with values, respectively, equal to 16%, 30%,

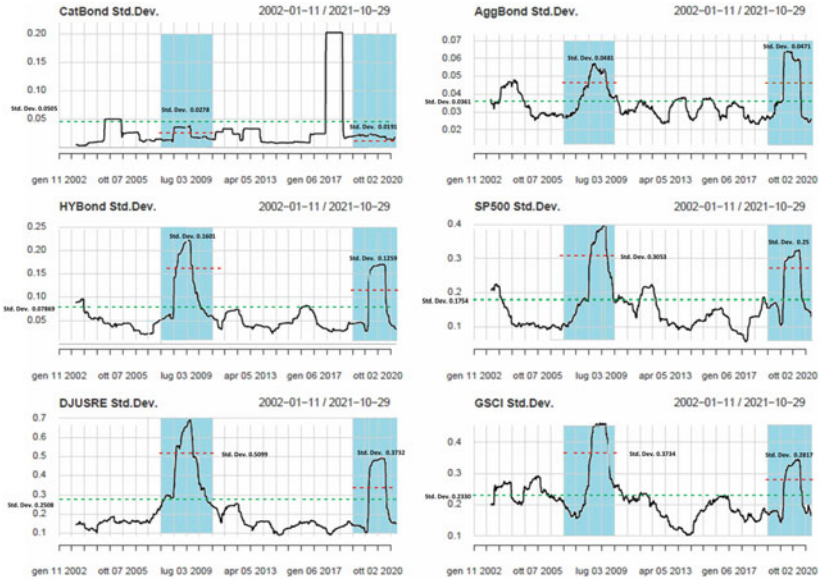

Fig. 8.5 Rolling volatility as of December 2021

51% and 37% during the GFC and 12.59%, 25%, 37% and 28% during pandemic.

Drawing attention to the more recent pandemic crisis, the latter variables analysed show a relevant increase in terms of volatility, in contrast with the trend clearly depicted in case of Cat bonds segments, which confirms the higher resilience to the influence of factors which remarkably affect the markets.

This aspect should be carefully considered in a scenario of portfolio diversification, considering the level of annualized standard deviation shown in the sample quite below those tracked by the counterparts.

The last section of the descriptive statistics is focused on the correlations between the variables to test possible co-movements, splitting into sub-samples the initial one to get insight about the trends of the returns analysed in different timeframes, specifically in turmoil markets period as GFC and pandemic.

Considering the whole sample, Cat bonds show an almost zero statistically significant correlation only with High Yields segment (0.0694).

Thus, in the whole period no correlation exists between traditional asset classes and the alternative one. As food for thought, the riskier fixed income segment shows a high positive and significant correlation with the equity index (0.6081), in line with the expectations of higher returns which those kinds of bonds require making them more similar, under certain circumstances, to the equity side than the investment grade one. The correlation between the corporate segments is equal to 0.20, the real estate index shows a higher positive correlation with the S&P500 (0.73) and the commodity index shows a positive correlation with other asset classes apart from no significant coefficient with Cat bonds and Aggregate bonds.

Drawing attention to the distribution of Cat bonds, consistently with what has been said up to now, the distribution, represents extremely negative monthly returns with the consequence of a flatter left tail, while the right one is more concentrated spanning from −0.15 to 0.05 (Fig. 8.6). Similar considerations may be applied to the High Yield segment as well as the equity one. In contrast, the investment grade segment shows a high magnitude of returns dispersed around the mean, with the consequence of low information in the tails of the distribution.

Going forward, the correlation matrix in the financial crisis period (Fig. 8.7 and Table 8.3) shows a higher correlation between the traditional asset classes and Cat bonds, consistently with the previous literature (Carayannopoulos & Perez, 2015; Cummins & Weiss, 2009), up to 0.4485 with the High Yield segment and 0.3344 with S&P500. In this

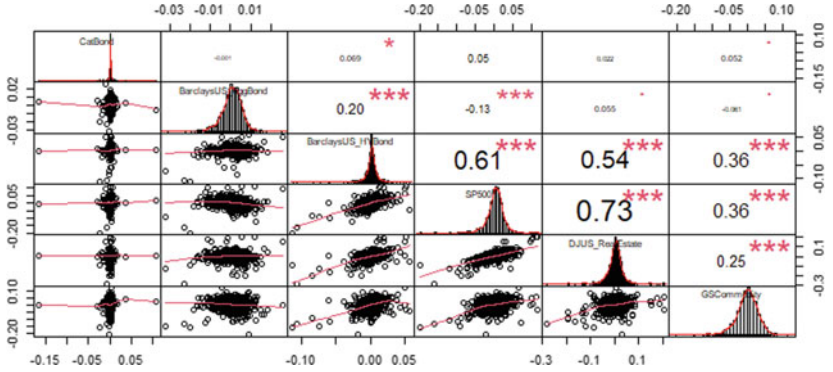

Fig. 8.6 Correlation matrix 2002–2020

sense, it could be asserted that the increasing effect of GFC in correlation between Cat bonds and counterparts is related to the credit crunch connected to the financial turmoil.

In addition, in this sub-sample as expected the skewness is more pronounced for all the assets with negative extreme events moving the distribution on the left of the median, with the average that in most cases as for S&P500 turns to be negative throughout the GFC period (Fig. 8.7).

Going forward with reference to the Covid-related sample, Cat bonds show no significant correlation, at 5% level, with any other asset classes, strengthening the rationale of the advantages of Cat bonds in diversification strategies, due to their absence of correlation. In addition, the zero-correlation results provide insights towards the ability of Cat bonds to be an alternative instrument of diversification not only in the context of markets in general, as shown by the results in the whole sample, but also with the occurrence of market turmoil as in 2020 ensuring a higher stability within portfolios.

However, it has to be stressed that as occurred with the financial crisis of the previous decade, the performance of Cat bonds slightly downturns in the run-up to April, confirming the rationale of the existence of an effect but to a lesser extent. As a consequence of that, the left tail of the distribution of Cat bonds returns is heavier than the right tail, in line with expectations.

Analysing the results of the other variables, as expected the correlation between High Yield segment, S&P500, Dow Jones and Commodity index sharply increase overcoming the 50%, consistently to what already recorded during the GFC across 2007 and 2009. Similar consideration can be extended to the investment grade segment.

Lastly, taking into account the distribution of the traditional asset classes, it can be positively evaluated the rally recorded in the second part of 2020 and then extended to the whole of 2021 due to the discovery of Covid-19 vaccine (Fig. 8.8).

In conclusion the results obtained at this stage, confirm the benefits of Cat bonds in diversification strategy, based on the low correlation with traditional asset classes, in particular considering the market turmoil provoked by Covid-19 with the lower volatility recorded by Cat bonds compared to other assets.

Table 8.3 Correlation matrices

Sample 2002–2001	*CatBond*	*AggBond*	*High yield bond*	*S&P500*	*Real estate*	*Commodity*
CatBond	1					
AggBond	−0.001	1				
High Yield Bond	0.0694*	0.2046***	1			
S&P500	0.0503	−0.1305***	0.6081***	1		
Real Estate	0.0216	0.0547	0.5435***	0.7306 ***	1	
Commodity	0.0525	−0.0607	0.3589***	0.3591 ***	0.2511***	1
Sample 2007–2009						
CatBond	1					
AggBond	0.2891**	1				
High Yield Bond	0.4485***	0.1881	1			
S&P500	0.3344***	−0.0524	0.6822***	1		
Real Estate	0.0966	−0.0961	0.5228***	0.787***	1	
Commodity	0.3298***	−0.0689	0.406***	0.4347***	0.268**	1
Sample 2020–2021						
CatBond	1					
AggBond	0.0566	1				
High Yield Bond	0.0767	0.583***	1			
S&P500	−0.0156	0.3454***	0.8646***	1		
Real Estate	0.0102	0.4163***	0.8609***	0.8815***	1	
Commodity	0.0279	0.1503	0.5939***	0.5891***	0.4738***	1

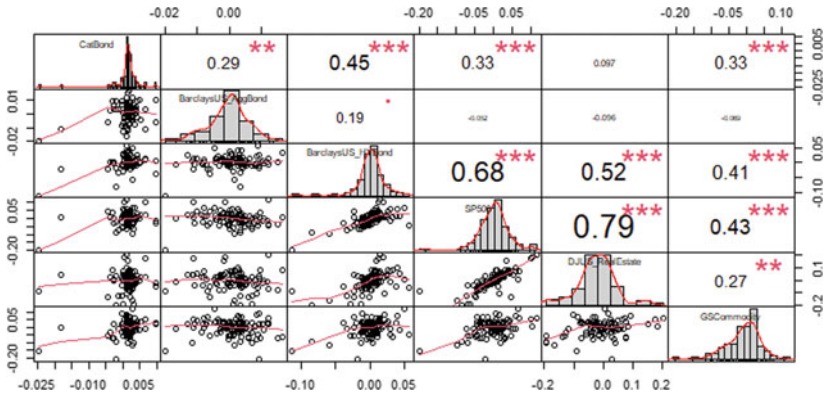

Fig. 8.7 Correlation matrix 2007–2009 (p-values [0, 0.001, 0.01, 0.05, 0.1, 1] <=> symbols [“****”, “***”, “**”, “*”, “.”, " “])

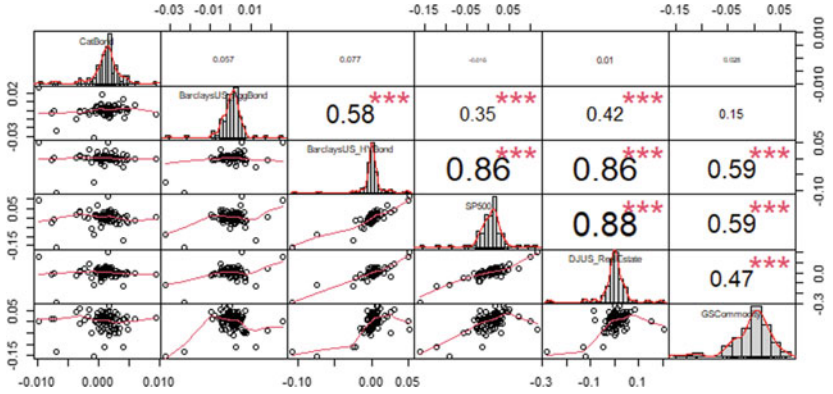

Fig. 8.8 Correlation matrix 2020–2021 (p-values [0, 0.001, 0.01, 0.05, 0.1, 1] <=> symbols [“****”, “***”, “**”, “*”, “.”, " “])

Regression Analysis and Mean–Variance Spanning Tests

At this stage, the objective is to verify to what extent traditional asset classes-related performances act as predictors of weekly Cat bond returns. In this perspective, the model adopted is based firstly on an OLS regression methodology with different lifespans, consistently with the previous descriptive statistics section.

The initial performed model which includes all predictors, aims at testing the weaknesses of the predictor variables to describe the trend of Cat bonds returns. Indeed, if the lack of correlation is evident from the correlation matrices, the regression may provide useful suggestions towards the independence of Cat bonds in the sample considered.

The first model run deals with the entire lifespan of the sample from 2002 to 2021. In this case, as expected, none of the predictors shows a significant association with the dependent variable. In this sense, even removing the influential points from the regression, by the means of Cooks' distance the results are similar and thus not reported in Table 8.4.

Excluding the effect of the intercept, considering the p-value of the model, it turns not to be significant in the coefficients related to predictors confirming the lack of any linear association between traditional asset classes and Cat bonds.

Analysing the value of R-squared and the adjusted R-squared, both provide further evidence of the poor performance of predictors with values far below 10%.

Particularly relevant are the results shown by the VIF, indeed despite the linear correlation found between S&P500 and Real Estate segment, the value is far below the threshold, implying that no multicollinearity exists between regressors.

Table 8.4 Regression model 2002–2021

	OLS Regression			
y = Cat bonds	*VIF*	*Coefficient*	*S.E.*	*p value*
Constant		0.0012222***	0.0002	4.75e-08
AGG bond	1.212565	−0.0084769	0.0479	0.8590
High yield Return	1.935194	0.0416248	0.0278	0.1340
S&P500	2.909932	0.0091122	0.0153	0.5510
Djusre	2.288462	−0.0087691	0.0095	0.3550
GSCI	1.2027	0.0062	0.0074	0.4050
R-squared	0.0066			
Adj R-SQ	0.0011			
F	1.375			
Prob > F	0.231			

p-values (0, 0.001, 0.01, 0.05, 0.1, 1) < = > symbols ("***", "**", "*", ".", " ")

Therefore, the hypothesis of Cat bonds independence must be accepted confirming the results obtained in the first part of the analysis.

The following step has been replicating the same regression on the pandemic period, which, as already explained, shows specific peculiarities compared to traditional financial market crises.

As shown in Table 8.5 the results of the OLS regression are in line with the purpose of the paper and as a result, it is possible to assert the resilience of Cat bonds performance during the last two years. Indeed, the model depicts the significance of the intercept with a level of confidence of 99% only. Going into detail as in the regression before, the model, due to the scarce results in terms of *R*-squared and its adjusted value, does not show any variable with a significant coefficient at a 95% confidence level, and therefore each variable chosen is not able to properly describe the performances of Cat bonds returns.

As matter of fact, the *p*-value of the regression confirms the null hypothesis of the predictors coefficient statistically equal to zero, providing evidence of Cat bonds returns as a valuable alternative to traditional investments.

Therefore, the weak results of the regression models in all the samples analysed confirm the considerations which come from the descriptive statistics in the path of the absence of linear correlation between Cat bonds and the other variables considered.

Table 8.5 Regression model pandemic crisis 2020–2021

	OLS Regression			
y = Cat bonds	*VIF*	*Coefficient*	*S.E*	*p value*
Constant		0.001***	0.0003	0.000323
AGG bond	1.911	−0.303	0.0584	0.6057
High yield	8.208	0.0718	0.0453	0.1165
S&P500	6.513	−0.0253	0.0203	0.2169
Djusre	5.753	−0.0035	0.0128	0.7879
GSCI	1.8120	−0.0010	0.0095	0.9144
R-squared	0.04			
Adj R-SQ	0.02334			
F	0.6598			
Prob > F	0.6548			

p-values (0, 0.001, 0.01, 0.05, 0.1, 1) < = > symbols (“***”, “**”, “*”, “.”, " “)

In other words, the lower volatility (even if partially related to the illiquidity of Cat bonds) in a context of economic turmoil, the low correlation in particular since the post-financial crisis and the poor results of predictors in the regression models performed, provide huge evidence of the rationale to include Cat Bonds in portfolio diversification strategies.

Lastly, in order to check the robustness of the evidence provided till now, the last part of the analysis involves the identification of possible portfolios in which to include Cat bonds. In this way, the aim is to measure to what extent this niche asset class could represent a diversification tool. In order to do so, the first step is to apply the mean–variance spanning tests on the returns included in the analysis. In particular, a portfolio with Cat bonds will be tested against a portfolio composed only of traditional asset classes.

If the test rejects the null hypothesis of the test, it means that the inclusion of Cat bonds makes available payoffs previously unattainable by portfolios composed by traditional asset classes combination.

This test has been carried out on the whole sample and more specifically in the pandemic sample to test the resilience of the alternative asset class in this peculiar crisis not originated in financial market.

Looking at the results (Table 8.6), the inclusion of Cat bonds in traditional portfolios implies that the derived portfolios deliver superior mean–variance payoffs, rejecting the null hypothesis.

In particular, Cat bonds is outside the mean–variance frontiers of traditional portfolios composed by bonds, equity, commodities and real estate segments.

Table 8.6 Spanning test

GMM 2002–2021		*GMM 2020–2021*	
Chisq (Linear Hypothesis)	53.685***	Chisq (Linear Hypothesis)	337.01***
P-value	8.54E-10	*P*-value	2.20E-16
Chisq (Residuals)	8063.8***	Chisq (Residuals)	1655.6***
P-value	2.20E-16	*P*-value	2.20E-16

p-values (0, 0.001, 0.01, 0.05, 0.1, 1) < = > symbols (“***”, “**”, “*”, “.”, " “)

Portfolio Diversification Analysis

Going forward with the analysis, one key issue regards the implementation of a portfolio optimization methodology, trying to trace the possible diversifier behaviour of Cat bonds. Thus, a benchmark portfolio, acting as a sort of market proxy, has been created. In this sense, the benchmark is composed by Aggregate bonds, High Yield bonds, S&P500, REITs and Commodities and it has been firstly built up using equal 20% weights, anchoring the results to an equidistributional system of weights. Then, the assets in this "traditional" portfolio have been freed from constraints in order to determine the best weights trying to maximize return, minimizing variance.

The next step of the analysis has been building up alternative dynamic portfolios adding to the aforementioned Cat bonds asset classes, attempting to investigate its supposed beneficial diversification effects. As a result, cumulative weights equal to 1, long position and anchored return paired to traditional assets portfolio are set as constraints in building the target portfolio. Lastly, traditional asset classes are allowed to oscillate up to 45% simulating empirical diversification strategies.

The portfolio simulation has required some training period of observing return to let the weights be allocated optimally. The training period consists of 52 weeks, and the resulting weights are then rebalanced on a three-week frequency.

This procedure has been carried out with reference to the whole sample and particularly focusing on the pandemic sample. Table 8.7 represents the main outcomes of the simulation in terms of summary indicators. Specifically, for what concerns the 2002–2021 timespan, the analysis of the risk-return dynamics shows that when considering the 10% Cat bonds portfolio, the outcome responds to reducing returns as well as risk. As food for thought, due to the illiquidity of Cat bonds as an alternative asset class, a decrease in portfolios annualized returns is almost obvious, pairing with a consistent reduction in risk and a low correlation with the market portfolio as shown by the betas, both in bearish and bullish periods.

With specific reference to Sharpe Ratio and Modified Sharpe Ratio, portfolio efficiency appears increasing when adding a certain percentage of Cat bonds. In particular, the Sharpe ratio moves from 0.32 in the benchmark portfolio to 0.38 rebalancing the weights still remaining in the context of traditional assets to a further increase to 0.46 when adding a mean percentage of 8.4% of Cat bonds. Similarly, removing weights constraints in terms of traditional assets, the inclusion of a mean

Table 8.7 Portfolios 2002–2021

Portfolio 2002–2021	*% Catbond*	*Annualized return*	*Annualized Std. Dev.*	*Annualized sharpe ratio*	*Sharpe ratio*	*Modified sharpe ratio*	*Beta*	*Beta bear*	*Beta bull*	*Maximum drawdown (%)*
Benchmark *All Traditional assets with equal weights of 20%*	–	0.0610	0.1104	0.3236	0.04487	1.1403	1	1	1	0.32
Traditional Assets *Traditional Assets without constraint maximizing return with minimum variance*	–	0.0530	0.0714	0.3851	0.0534	1.5063	0.6090	0.6308	0.6059	0.32
Cat bonds 10%	8.40	0.0573	0.0684	0.4604	0.0638	1.8496	0.5894	0.6145	0.5871	0.29

Portfolio 2002–2021	*% Catbond*	*Annualized return*	*Annualized Std. Dev.*	*Annualized sharpe ratio*	*Sharpe ratio*	*Modified sharpe ratio*	*Beta*	*Beta bear*	*Beta bull*	*Maximum drawdown (%)*
Cat bonds with maximum weight 10%, return target and weight oscillation anchored to the portfolio with Traditional Assets										
Cat bonds 10% NO CONSTRAINT *Cat bonds with maximum weight 10% and with Traditional Assets free to reach their maximizing weight*	7.97	0.0533	0.0665	0.4141	0.0574	1.6437	0.5733	0.5872	0.5701	0.29

percentage of 7.97% Cat bonds results in a 0.41 annualized Sharpe ratio. These results are particularly relevant providing evidence of the beneficial effects of Cat bonds inclusion. However, these beneficial impacts can be lowered when applied in an unconstrained regime. This could be the case, taking into account the characteristics of the alternative asset class, in terms of lower liquidity and volume of exchange. Similar considerations can be applied by comparing the results of the modified Sharpe ratio which in place of standard deviation adopts as denominator the value at risk (VAR). These results are even more evident comparing the annualized returns which are quite similar in all portfolios and the annualized standard deviation, which conversely drops drastically when dealing with a small percentage of Cat bonds in traditional portfolios.

With reference to the portfolio performance as represented in Fig. 8.9, it is possible to highlight the extent to which the simulation traces the beneficial impact of Cat bonds inclusion in traditional portfolios. In particular, during the economic turmoil, this beneficial effect is even more pronounced, given the peculiar lower volatility of Cat bonds and being such asset uncorrelated with traditional ones. In this sense, the inclusion of Cat bonds in portfolios results in a lower negative peak during GFC and in the pandemic.

With reference to the Pandemic crisis, due to its peculiarity, being originated from a disease, the inclusion of Cat bonds is tested in portfolios, simulating different percentage ranges in which the weights are free to oscillate in the same scheme of weights constrained as in the case of a whole sample. In particular, two additional portfolios are tested at this stage, increasing the maximum amount available to invest in Cat bonds, moving from 10 to 15% and lastly 20%.

In particular, the four portfolios determined a calculation of the Cat bonds percentage as follows, 7.6%, 10.7%, 15.5% and finally 5%, leaving the weights related to traditional assets classes free to oscillate. In terms of simultaneous evaluation of returns and standard deviation, it could be stated that despite the benchmark records the highest annualized return, equal to 9.4%, it is dramatically affected by a higher standard deviation equal to 18.4%. Optimizing such portfolio turns, in a smaller return, equal to 7.14%, almost halving the annualized standard deviation.

The intriguing part of the analysis, which confirms the beneficial effects of Cat bonds inclusion in traditional portfolios in the context of economic turmoil, shows that a small reduction in returns provokes a sharp decrease into the annualized standard deviation, providing better results in terms of Sharpe ratios. Comparing the portfolios including Cat bonds, it is evident

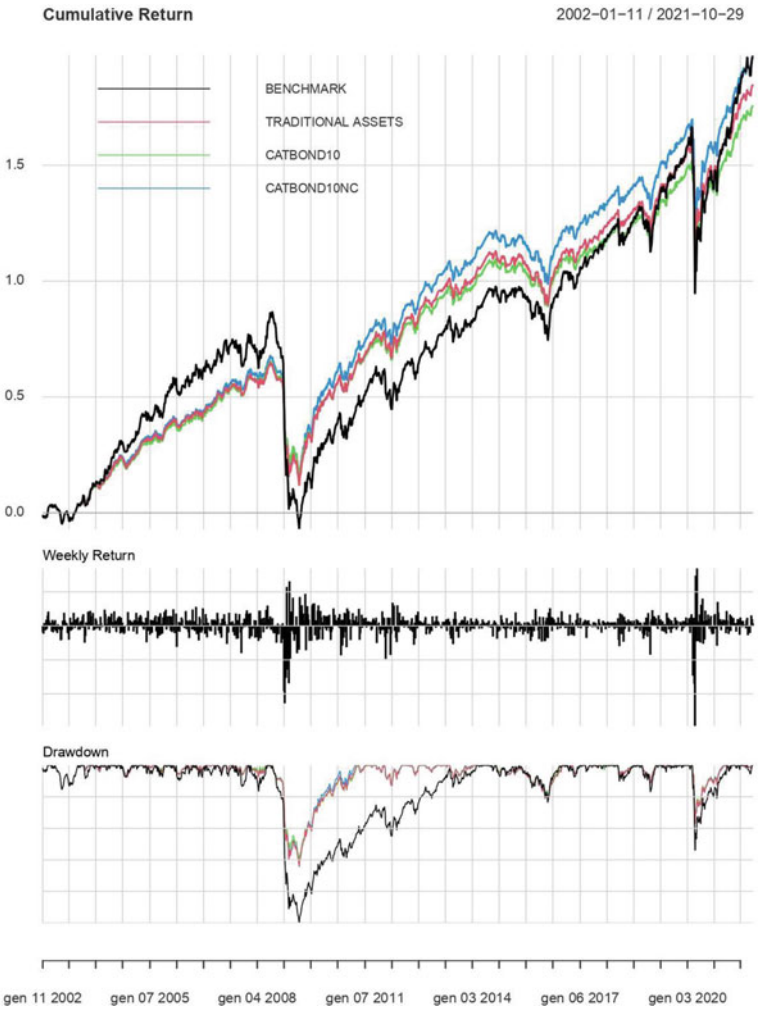

Fig. 8.9 Portfolios performance 2002–2021

how the beneficial effects are diminished when the context in which such inclusion occurs is not constrained, as in the case of portfolio weights free to oscillate, and in the case of higher available amount of Cat bonds to be included in the portfolio.

In turn, it could be stated that the best portfolio is the one which adopts a mean percentage of Cat bonds equal to 7.6% resulting in the highest Sharpe ratio. Thus, it is evident that overweighting the beneficial effects of Cat bonds turns to be harmful in portfolio diversification logic. In other words, the diversification opportunities exist, but caution is needed.

Dealing with Beta scores, as expected the portfolios with Cat bonds reduce the volatility correlation with the market, almost halving the value compared to the beta of the optimized traditional asset-based portfolio. With reference to maximum drawdown (MDD), it is defined as the frequency of large losses for the portfolio analysed, in other words it provides a useful insight in terms of largest percentage drop in price from a peak to following lowest value. In terms of risk measurement, it provides useful information for investors in terms of worst-case scenarios to be minimized (Figs. 8.10 and 8.11).

In this case, comparing the results in Table 8.8 MDD diminishes from 28% in case of benchmark portfolio to 17% in case of portfolio with maximum 10% of Cat bonds to be invested in. The lowest results are

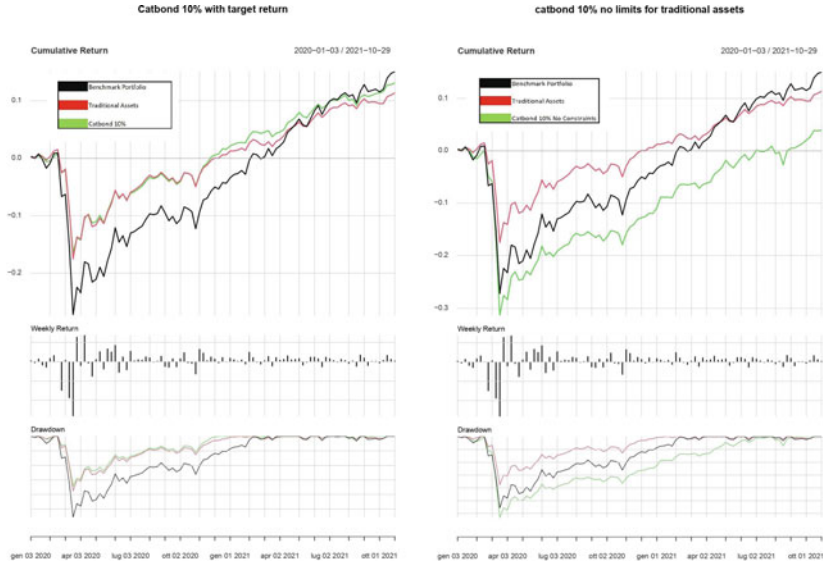

Fig. 8.10 Performance with Cat bonds anchored to 10%, 2020–2021

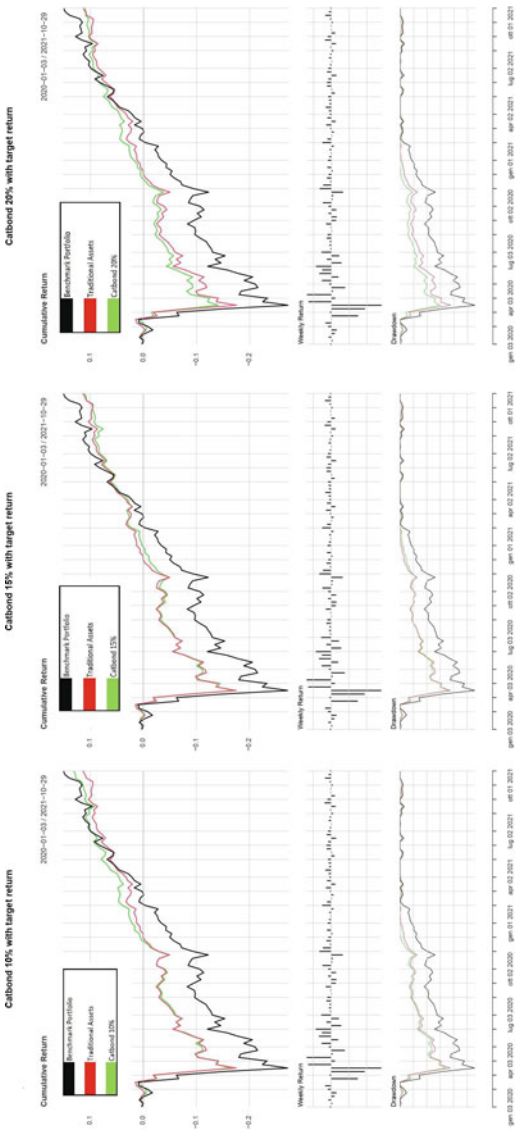

Fig. 8.11 Portfolios performances with Cat bonds, 2020–2021

performed by increasing the amount of Cat bonds to a maximum of 20%, discounting a worsening in the Sharpe ratio results.

Lastly, in the assumption of maximum 10% of Cat bonds in traditional portfolios with no constraints related to the traditional assets weights, the results are the opposite. Indeed, the MDD peaks at 32%, the Sharpe ratio drastically drops to 0.235 from 0.8, in the portfolio with 7.6% of Cat bonds. The need to be cautious is therefore evident comparing these two results.

Conclusions

The quantitative analysis compares different indices and highlights intriguing divergences among the indices representative of Cat bonds, stocks, bonds, real estate and commodity markets.

The minimal correlation evidenced for Cat bonds market with respect to other asset classes corroborates the rationale of adopting catastrophe bonds as effective instruments to manage financial risk and to transfer the risk directly to the financial market as well as to mitigate risks.

In this perspective, Cat bonds represent a source of diversification even at an institutional level, considering the potential losses deriving from natural disasters and the following call-to-action for governments to refund the suffering territories. Indeed, ever-increasing consensus has been reached by this alternative asset class in the last few years.

Cat bonds performance shows no correlation or linear independence with the returns of other indexes that represent asset classes as corporate bonds, stocks and commodities. Thus, Cat bonds offer opportunities in terms of portfolio diversification, with particular reference to the pandemic period, when no correlation with traditional asset classes is recorded. Considering the whole sample, similarly the absence of relevant co-movements among the chosen variables and Cat bonds is depicted.

Despite an increasing correlation in the occurrence of GFC, the independence and the absence of correlation is more evident, taking into account the pandemic crisis.

The analysis performed remarks the classification of this alternative financial instrument as a valuable source of diversification and as a consequence, investors should take into account the opportunities arising from Cat bonds. In this sense, the last part of the analysis simulates the trends of portfolios with and without Cat bonds, showing that including such

Table 8.8 Portfolios 2020–2021

Portfolio 2020–2021	*% Catbond*	*Annualized return*	*Annualized Std. Dev.*	*Annualized sharpe ratio*	*Sharpe ratio*	*Modified sharpe ratio*	*Beta*	*Beta bear*	*Beta bull*	*Maximum drawdown (%)*
Benchmark *All Traditional assets with equal weights of 20%*	–	0.0935	0.1842	0.4725	0.0655	1.4910	1	1	1	28
Traditional Assets *Traditional Assets without constraint maximizing return with minimum variance*	–	0.0714	0.1101	0.5892	0.0669	1.6432	0.6447	0.6759	0.6393	17

(continued)

Table 8.8 (continued)

Portfolio 2020–2021	*% Catbond*	*Annualized return*	*Annualized Std. Dev.*	*Annualized sharpe ratio*	*Sharpe ratio*	*Modified sharpe ratio*	*Beta*	*Beta bear*	*Beta bull*	*Maximum drawdown (%)*
Cat bonds 10% *Cat bonds with maximum weight 10%, return target and weight oscillation anchored to the portfolio with Traditional Assets*	7.6	0.0679	0.1092	0.5979	0.0829	2.1260	0.5755	0.6018	0.5471	17
Cat bonds 15% *Cat bonds with maximum weight 15%, return target and weight oscillation anchored to the portfolio with Traditional Assets*	10.69	0.0645	0.1034	0.5608	0.0778	1.9620	0.5446	0.5747	0.5030	17

Portfolio 2020–2021	*% Catbond*	*Annualized return*	*Annualized Std. Dev.*	*Annualized sharpe ratio*	*Sharpe ratio*	*Modified sharpe ratio*	*Beta*	*Beta bear*	*Beta bull*	*Maximum drawdown (%)*
Cat bonds 20% *Cat bonds with maximum weight 20%, return target and weight oscillation anchored to the portfolio with Traditional Assets*	15.53	0.0605	0.0941	0.5735	0.0795	2.0585	0.4901	0.5086	0.4681	15
Cat bonds 10% No Constraint *Cat bonds with maximum weight 10% and with Traditional Assets free to reach their maximizing weight*	4.98	0.0386	0.1890	0.1697	0.0235	0.25403	0.9687	1.1571	0.7916	32

assets in traditional portfolios allows to beat the market in terms of attainable payoffs drastically reducing the standard deviation, in the light of the higher stability of Cat bonds returns over the pandemic period as well as a lower volatility. However, these beneficial effects are negatively affected by the inner characteristics of the instrument if it is overweighted in the portfolio as well as Cat bonds inclusion in portfolios is accompanied by a less constrained environment.

However, it is fruitful to remember that such peculiar instruments are also characterized by higher illiquidity, high exposure on natural disaster risks and small markets.

To sum up, this work provides a further contribution to the existing studies on Cat bonds, by demonstrating the extent to which the diversification opportunities of Cat bonds are even more evident in the context of economic turmoil such as the recent pandemic crisis. In this sense, however, it can be remarked the need for caution in the process of inclusion of Cat bonds in traditional portfolios.

Nevertheless, the analysis only considers a long position for the assets in portfolios, as well as further analysis should be performed going outside the U.S. context in order to get more generalizable results. Thus, further research should be oriented to deepen the analysis on portfolio optimization including further constraints and rounding the existing to make the process as adherent to reality as possible. In addition, considering the duration upon issuance of the instrument as a proxy for risk might help comparing such tools with other fixed incomes.

Lastly, further research is required to investigate the consequences and effects of pandemic crisis in a long-term period of observation as well as to investigate how a subjective component of investors could alter the results robustness, affecting relevant factors as the Betas.

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PART III

Financial Inclusion

CHAPTER 9

Collaboration or Community? The Impact of the Institutional Forces in Promoting Social Crowdfunding

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Introduction

Within the growing capacity of social investment to attract capital flows for philanthropic and sustainability reasons, social crowdfunding has emerged as a promising new option to secure large numbers of small

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donations from the socially conscious crowd for the needs of projects run by both established non-profit organizations and social benefit startups (Bruton et al., 2015; Chan & Parhankangas, 2017; Clarkin, 2014; Clarkin & Cangioni, 2016; Parhankangas & Renko, 2017; Walthoff-Borma et al., 2018). As social investment thrives, the importance of investigating its impact on organizational practices, stakeholders and investor behavior increases (Bugg-Levine et al., 2012; Desa & Koch, 2014; Doherty et al., 2014; Peredo & Mclean, 2006; Santos Barbosa et al., 2017). Despite the growth of academic works dedicated to the topic given the wider impacts of crowdfunding considered as an innovative form of democratization of financial services (Gleasure & Feller, 2016), the mechanisms of social crowdfunding have not been extensively investigated and are not yet well understood by the extant literature (Ahlers et al., 2015; Barnett, 2015; Bruton et al., 2015; Mollick, 2014).

Aspects currently unexplored by existing studies include the impact of institutional forces in promoting social crowdfunding and investigating whether the nature of a social crowdfunding campaign affects the propensity to achieve funding goals (Pollack et al., 2021). Our article attempts to fill these gaps by exploring if and how social crowdfunding triggers the success of social projects by investigating the role played by an Italian social crowdfunding platform (SCF), i.e., Meridonare, owned by an institutional force such as Banca di Napoli. Foundations of Banking Origin (FBO) are non-political and non-profit institutions whose purpose is to promote initiatives of common interest for the territory and the local community in which they operate. As part of the Foundation's philanthropic activity, Meridonare's goal is to support all meritorious and innovative social, cultural, and civic projects that promote the culture of philanthropic contribution, a sense of community, and the creation of strong and cohesive social ties. Meridonare does this by focusing on the resources and talents of Southern Italy, where the banking foundation is based (Presenza et al., 2019).

By examining all the 140 projects that Meridonare undertook in the period 2016–2018, our study analyzes how the platform acts in enhancing and facilitating the interaction between institutional forces (i.e., the banking foundation), non-profit organizations (NPOs), and private investors that participate in the financing of social projects. Using a unique and proprietary database, we examine whether the characteristics of community involvement ("human touch"), the implementation of promotional actions, and the level of collaboration among social crowdfunding ventures, the platform, and the banking foundation are critical determinants of crowdfunding success. While the role of local community in traditional venture funding is probably less critical, it plays a

much more central role in social crowdfunding. In fact, whether defined geographically or virtually, the *community* of stakeholders on which the crowdfunding social project is based represents its primary source of funding. Similarly, the *collaboration* of a crowdfunding platform in promoting the projects with targeted actions could play a key role in the success of a fundraising campaign compared to other crowdfunding categories (e.g., equity and landing crowdfunding).

We explore these relations by considering three assumptions. The first one considers that the success of a social crowdfunding campaign is positively related to the intensity of the *collaboration* between the promoters of the project and the social crowdfunding platform. The second assumption is that the success of a social crowdfunding campaign is positively associated with the human dimension of the promotion actions, i.e., *community* involvement, rather than to the technological or marketing dimension. As a third postulate, we believe that the introduction of innovative approaches elevates the strength of an institutional force in building a social entrepreneurial ecosystem.

Our findings support the relevant role that a social crowdfunding platform backed by an institution has on the success of a social crowdfunding campaign/project. In particular, the role of SCF and its *alma mater* (i.e., the banking foundation) emerges in the specific economic and financial context in which it operates and assumes relevance for the practice of social entrepreneurship. A second crucial element that emerges from our study is the importance of human touch that is expressed by community involvement. The involvement of the population through actions that leverage human-touch relationship and the social nature of the project increase the propensity to achieve the funding goals. As a result, proposed actions that are perceived as a good cultural fit with a community's values will be more likely to receive support from community members (Schneider, 1987; Schneider et al., 1995).

Our research contributes to the current literature along two main dimensions. Firstly, we analyze crowdfunding in the context of social entrepreneurship, focusing not only on the technical role played by the platform Meridonare, but also on the contribution made by the institutional force represented by the banking foundation. Confirming the indications of Renko et al. (2019), social crowdfunding is a useful test to verify the attractiveness of new projects with a social character. At the same time, it makes it possible to financially support, in the initial phase,

social initiatives that generally struggle to raise financial resources. Understanding the variables and the actors that mostly fuel the success of a crowdfunding campaign is relevant for organizations focused on sociality to create momentum and excitement around a common cause, and to build a community around the organization by activating current donors, in addition to finding new ones (Azemati et al., 2013; Bruton et al., 2015; Walthoff-Borma et al., 2018). Secondly, we investigate the phenomenon of social crowdfunding, still little explored by the extant literature, by drawing on a proprietary dataset and by testing our research hypotheses through rigorous empirical work. Since most of the existing literature is descriptive in nature (including project or venture quality, human capital, financial and nonfinancial rewards, and the narratives used on the crowdfunding site), conducting an empirical analysis on the effects of local *community* involvement, the effectiveness of the promotion actions, and the *collaboration* on social crowdfunding success represents a novel contribution to the current literature (Ahlers et al., 2015; Cholakova & Clarysse, 2015; Colombo et al., 2015; Drover et al., 2015).

The remainder of this paper is organized as follows. Section 'Conceptual Framework: The Italian Philanthropic System' introduces the conceptual framework by focusing on the Italian philanthropic system and the role of banking foundations as an institutional force. Section 'Literature Review' briefly reviews the relevant literature. Section 'Research Design' presents the data and describes the empirical strategy, while Section 'Results' reports the results of our empirical analysis. Section 'Discussion and Conclusions' concludes with the discussion of managerial implications and the limitations of our study.

Conceptual Framework: The Italian Philanthropic System

The Role of Foundations of Banking Origin (FBO)

In Italy the Foundations of Banking Origin (FBOs) system consists of 88 foundations originally made up of banks and savings banks to exercise direct philanthropy. In the 1990s, the Italian legislator intervened with a series of regulations aimed at creating favorable conditions for the aggregation of the numerous small banks. Therefore, the Foundations have become the owners—rather than subsidiaries—of banking institutions to protect the aggregation of the system itself and to guarantee the

stability of the property which was initially both private and public (Amato Law no. 218/90). Subsequently, the role of the FBOs (Ciampi Law no. 461/1998 and Legislative Decree 153/1999) has been specifically structured with the aim of separating the credit activity of the banks from the philanthropic activity. The Italian FBOs are private, non-profit entities which exclusively pursue purposes of social utility, collective interest, and economic development of their region through the resources generated by the prudent investment of financial assets. Although they are private legal entities, the FBOs are subject to the supervision of the Italian Ministry of Economy and Finance (MEF) in order to strengthen their role as institutional investors and regulate the processes of financial disbursement. At the end of 2019, the FBOs' accounting assets reached a total of €40.3 billion and 86.0 percent were financial assets, confirming the role of the foundations as important institutional forces.

The main mission of FBOs is to promote the enhancement of their assets to generate profits to be allocated to the disbursement of direct donations to third-sector subjects operating in the foundations' territory. This technical method represents the simplest and most immediate way for a banking foundation to carry out its philanthropic activity. In recent years, a more strategic approach has emerged, which allows FBOs not only to support social projects proposed by others, but also to become policy makers of social progress and innovation. This is achieved through the pursuit of projects aimed at carrying out initiatives of social utility that have value in the medium-long term. The change in strategy takes place through the establishment of an instrumental company which becomes the tool to support initiatives aimed at raising the social impact of the foundation's philanthropic activity. Direct investment thus represents a new method that goes alongside the simple disbursement of financial resources and extends the time horizon of the foundation's action. Figure 9.1 provides a schematic illustration of the foundation's direct investment method.

The Foundation of Bank of Naples, the Meridonare Platform and Its Operating Model

Following the direct investment approach, in 2015 the Foundation of Bank of Naples (FBN) established the platform Meridonare with the aim of using technological innovation, represented in this case by the

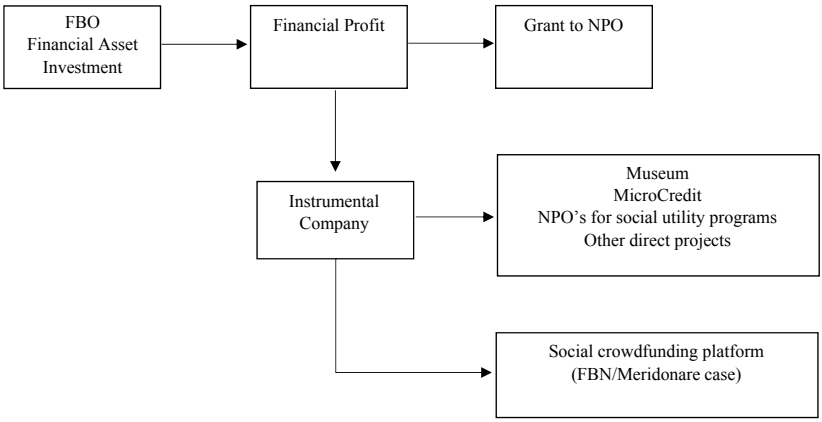

Fig. 9.1 The direct investment of FBO

non-profit crowdfunding platform, to improve its support for the promotion of the social ecosystem of the local territory. At that time the main crowdfunding operators in Italy were DeRev, Produzioni dal Basso, BuonaCausa and PlanBee. None of these operators, however, specialized in social activities, but rather on innovative ideas. The FBN fully financed the launch of the Meridonare platform, including the hiring of the first three employees. They were selected both on the basis of their IT skills and because they were founders of a small former local social platform. An aspect to consider is that the owner of the platform (FBN) is itself a non-profit operator and therefore the Meridonare platform does not pursue profit objectives, but it aims to multiply the collection of financial means to invest in charity, toward social initiatives on the territory. In 2016, the first full year of activity of the social crowdfunding platform, the FBN more than tripled its intervention capacity by directly financing projects for an amount of 370,000 euros, plus 850,000 euros conveyed through Meridonare.

To ensure a greater probability of success for social crowd funders, who often lacked specific IT, marketing and social media skills, Meridonare has created a team of tutors to offer various support services with the aim of promoting the crowdfunding campaign before, during and after its realization (Minguzzi et al., 2019). To facilitate access to the platform for social project proposers, Meridonare has chosen to offer

its users various support services free of charge: the video presenting the request, the strategic study of the campaign, the organization of events to present the crowdfunding campaign, banking assistance for the opening of a dedicated current account, the use of a multimedia totem (donamat). Specifically, the donamat is a tool that allows to illustrate the video of the campaign and, at the same time, to collect the donations in order to facilitate the collection during special events (such as, for example, the one held at the San Carlo Theatre in Naples). To support the dissemination of knowledge of the campaigns present on the platform, Meridonare has developed an online journal (Meridonare news) which contains various editorial activities including interviews with associations/organizations promoting social projects.

The fundamental contribution to the development of the crowdfunding platform was the instrumental relationship with the Foundation of Bank of Naples. In addition to financing the start-up phase of the project, the FBN has been, from the earliest stages, the main financier of Meridonare as part of a strategy that saw the crowdfunding platform as the ideal channel for enacting its social interventions. In implementing the strategy, the Foundation monitors and analyzes the content of each offer and decides whether to intervene financially in favor of the most deserving proposals in order to amplify its philanthropic mission, stimulating and promoting projects with social purposes with the use of new technicalities.

Literature Review

In recent years, the concept of social enterprise has received increasing attention in the economic and social literature, as a new and very significant phenomenon. According to the double bottom line proposed by Emerson and Twersky (1996), social enterprises are viewed as hybrid organizations (Cornelius et al., 2008), and their reason for existing is seen as a fusion of economic and social goals (Emerson, 2003). Generally, the economic goal is represented by the products and services offered, and social enterprises are expected to be able to generate income to achieve financial self-sufficiency. The social goal is instead focused on enhancing their social performance and is established for serving public interests (Dart, 2004; OECD, 1999; Santos Barbosa et al., 2017). Some authors proposed that foundations should incorporate multiple goals for constructing the triple bottom line of social enterprises (Henriques &

Richarson, 2004; Nussens et al., 2006). They placed emphasis not only on economic and social goals, but also on the citizen goal that could increase people's public engagement (Nussens et al., 2006).

Social enterprises take many forms and play multiple roles in promoting community-oriented initiatives. Social entrepreneurs not only promote economic development, but also offer innovative solutions to unsolved social problems (thus contributing to the progress and sustainability of the global economy) and improve equality and community development (Liu et al., 2014; Reid & Griffith, 2006). Although the literature on social entrepreneurship is still evolving and far from being conclusive, today the peculiarities that characterize the identity of social enterprises are well known. Numerous authors have highlighted not only the motivational, ethical, and social determinants, such as solidarity, reciprocity, and direct participation in management, quest for justice and equality (Austin et al., 2006; Bugg-Levine et al., 2012; Dart, 2004; Desa et al., 2014; Doherty et al., 2014; Margolis & Walsh, 2003; Nel & McQuaid, 2002; Santos Barbosa et al., 2017; Zahra et al., 2009), but also the specific aspects of their management that differentiate non-profit companies from for-profit ones (Dorado, 2006; Landes Foster et al., 2009; Salavou & Cohen, 2020; Sparviero, 2019; Spear, 2006).

Unfortunately, social enterprises have very limited resources compared to commercial firms (Austin et al., 2006; Griffiths et al., 2013; Kickul & Lyons, 2015). Their performance is mainly assessed on the basis of factors external to the company represented by the creation of social values for customers and the achievement of a social mission for the members of the community (Calderini et al., 2018; Caroli et al., 2018; Chiappini, 2017; Coombes et al., 2011; Moore et al., 2012a; Rizzi et al., 2018; Roman et al., 1999). For this reason, social enterprises suffer from limited funding opportunities as they encounter problems in securing loans and raising capital: they are not profitable or growth-oriented enough to access traditional financial markets, which results in a financial-social return gap and represents one of the biggest disadvantages social enterprises have to cope with (Bugg-Levine et al., 2012). This is why the financial aspects affecting social enterprises have increasingly become a topic of interest (Cash, 2018; Geobey et al., 2012; Jackson, 2013; Lagoarde-Segot, 2019; Moore et al., 2012b; Rizzi et al., 2018).

The difficulty to access credit and financial markets requires the identification of innovative financing models capable of attracting private financial resources to support social initiatives (Azemati et al., 2013). In

this context, the practice of raising funds for a project from a large audience of investors, generally using the Internet as a channel of operation (Josefy et al., 2017), has emerged as a promising new option. There are several crowdfunding initiatives ranging from fundraising in the form of equity (i.e., equity crowdfunding) or debt (i.e., lending crowdfunding), to finance the growth of new business ventures, to the subscription of donations in support of social impact projects (i.e., social crowdfunding).[1] Among the most critical aspects in determining the success of a crowdfunding campaign, the mobilization of resources assumes particular importance considering that crowdfunding tends to reduce the geographical barriers typical of more traditional financing channels (Josefy et al., 2017). In this context, web platforms as well as online communities have recently emerged to facilitate the interaction between social entrepreneurial initiatives and potential crowdfunders, and to raise funds mainly through non-traditional channels (Belleflamme et al., 2014; Ordanini et al., 2011; Schwienbacher & Larralde, 2010).

Crowdfunding allows social enterprises to find sources of funding from the crowd in the difficult initial phase and to attract public attention in the validation of new services to be launched; furthermore, crowdfunding can be used to create momentum and enthusiasm around a common cause, to build a community around the organization by activating current donors and by finding new ones (Gallucci et al., 2018; Lehener, 2013; Lehner & Nicholls, 2014; MacLeod & Hamingway, 2017; Renko et al., 2019; Rey-Martí et al., 2019; Schwienbacher & Larralde, 2010). In this context, the existing literature has not yet thoroughly investigated whether the will of donors towards charitable causes, through social crowdfunding, is expressed with the same intensity in physical circuits as compared to the use of digital channels.

[1] Crowdfunding could be classified into two macro-areas: donation crowdfunding and investing crowdfunding (Belleflamme et al., 2010). The first one encompasses the donation-based model, i.e., charity online fundraising campaign from companies structured as a non-profit organization; the second, instead, can be distinguished in active and passive investing crowdfunding. Passive investing crowdfunding encloses the lending-based and reward-based models, which differ from each other for the type of return provided to the investors, both of them, however, do not offer any possibilities for investors to become actively involved in the initiative. Active investing crowdfunding defines the equity-based model, that could be easily named crowd investing, and offers investors the opportunity to be actively involved in the initiative, in addition to offering rewards to them. This allows the investor base to actively contribute to covering the financial needs of small entrepreneurial ventures (Schwienbacher & Larralde, 2010).

Research Design

Data and Descriptive Statistics

Our work adopts a single case study, i.e., the Meridonare platform, representing an exclusive case of a social crowdfunding platform. A case is unusual when it presents some peculiarities that justify an in-depth study, which could also reveal insights into the normal processes/procedures/techniques and thus also have repercussions useful for everyday practice (Yin, 2014). Following Eisenhardt (1989), the study of a specific case allows to capture the dynamics of the specific phenomenon, relatively new in the literature.

The database consists of the information contained in each social project's evaluation form (comprising both fundraising campaign and social impact valuation) compiled at the end of each crowdfunding campaign. The evaluation and reporting activities involve the various phases of the crowdfunding campaign and cover the entire spectrum of activities ranging from the project submission phase to the end of the crowdfunding campaign. In the pre-campaign phase, Meridonare analyzes the project in terms of completeness, potentiality, and social impact by assigning its own evaluation judgment (Calderini et al., 2018; Chiappini, 2017; Moore et al., 2012a, 2012b; Rizzi et al., 2018; Roman et al., 1999). The preliminary assessment of the project aims to decide whether to place the request on the platform without the assignment of a score to be communicated to the donors. In the final phase, namely, at the end of the campaign, the crowdfunding platform management assesses the social impact of the campaign on the community and evaluates the social report of the funded project by releasing scores to donors (Gallucci et al., 2018; Minguzzi et al., 2019).

Table 9.1 presents the operational support activity provided by Meridonare by type of activity, as well as the total numbers for each activity. A total of 140 homogenous crowdfunding projects are included in the estimated models, all resulting from a single case study, the Meridonare platform, which represents an exclusive case of crowdfunding platform.

On average, each project has a funding goal of €20,000, attracted €10,000 in pledges from an average of 62 backers, and lasts three months. In the considered period, the aggregate value of the total budget requested is €2,650,819, while the budget collected is €1,190,124. The ratio of collected budget over requested budget is 44%. The total donors are 8,684 of which 5,289 individuals. The average donation per project

Table 9.1 Operational activity provided by Meridonare by type

Operational support activity	#	*Type of activity*
Number of events with Meridonare	106	Collaboration between SCF and NPOs
Number of articles on Meridonare news	171	Collaboration between SCF and NPOs
Number of views on Meridonare website	90,760	Collaboration between SCF and NPOs
Number of autonomous events	216	Community involvement
Number of total events	338	Community involvement
Number of total social contacts	159,526	Community involvement
Number of total articles	488	Community involvement
Number of donors	8,684	Community involvement
Number of months of campaign		Control variable
Evaluation range		Control variable

is €264. More than 60% of the projects included a video, as highlighted in Table 9.1. The website site reached 193,148 views (averaging 20,000 views per month), with 41,785 users, of which about 43% return periodically to the site. On average, the user browses the site for about two and a half minutes, viewing three different pages on average.

Empirical Methodology

We carry out our empirical analysis by exploiting a unique and proprietary dataset comprising 140 homogenous crowdfunding projects supported by Meridonare platform in the period January 2016–July 2018. These social projects are homogeneous in the sense that they all sought to address the same community defined by the metropolitan area of Naples in Italy. Specifically, the success of social projects, i.e., crowdfunding success, is proxied by three measures that we use as dependent variables in our probit and ordinary least square (OLS) empirical setting. The first one is represented by a dichotomous variable based on whether or not the funding goal was achieved through the crowdfunding campaign (i.e., *success of campaign*). The second one is represented by the amount of funds pledged (i.e., *funding*). The third one reflects the percentage of funds raised compared to the funding target (i.e., *funding ratio*). Our regression models control for unobserved characteristics that might affect the dependent variables other than our covariates of interest, such as the

year of the crowdfunding campaign, the campaign's rating attributed by Meridonare, and the length of the crowdfunding campaign expressed in months.

The independent variables are grouped into *community* and *collaboration* variables. The former refer to *community* involvement and reflect the degree of effectiveness of the campaign's promotion and support action (i.e., the total number of events held, the percentage of social events organized autonomously, the number of contacts over Internet channels and social networks, the total number of online and offline articles, the number of donors). The latter reflect the degree of *collaboration* between the promoters and the Meridonare crowdfunding platform (i.e., the percentage of social events organized with the support of Meridonare, the number of articles on Meridonare's web page, the number of views on Meridonare's web page).

Our baseline regression model for crowdfunding success takes the following form:

$$\text{Crowdfunding success}_{it} = \alpha + \sum_{nit} \beta_{nit} \left(\text{Community Variables}\right)_{nit} + \sum_{jit} \beta_{jit} \left(\text{Collaboration Variables}\right)_{jit} + Year_t + Rating_i + Lenght_i + \varepsilon_{it}$$

where the subscript i indicates the given social project, while the subscripts n and j indicate the collaboration and community variables for the given project, respectively; $Year_t$ represents year fixed effects; $Rating_i$ reflects the rating attributed by Meridonare to the given project; and $Lenght_i$ indicates the length of the crowdfunding campaign expressed in months.

We test our models for two different dimensions, i.e., *campaign* vs *FBN* dimensions. On the one hand, the *campaign dimension* investigates whether the level of collaboration between crowdfunders and Meridonare, and the characteristics of community involvement ("human touch") are critical determinants of social crowdfunding success. On the other hand, the *FBN dimension* examines whether the characteristics of the campaign and the level of collaboration between stakeholders influence the Foundation's intervention in providing financial support to the campaign.

Results

Main Findings

Our three assumptions are tested by specifying our estimated model for the three dependent variables, a dichotomous variable based on whether or not the fundraising goal was achieved (i.e., *success of campaign*), the natural logarithm of the amount of funds raised (i.e., *funding*), and the natural logarithm of the budget collected over the target budget (i.e., *funding ratio*). In Table 9.2 and in Table 9.3, probit models in columns (1)(2) show the model estimates for *success campaign*, while OLS models in columns (3)(4) show the model estimates for *funding,* and OLS models in columns (5)(6) report the model estimates for *funding ratio.*

In particular, Table 9.2 shows the model estimates for the "campaign dimension", examining whether the level of collaboration between crowdfunders and the platform, and the characteristics of community involvement ("human touch"), are critical determinants of social crowdfunding success. These relationships are tested for each respective dependent variable (i.e., *success campaign*, *funding* and *funding ratio*).

In terms of collaboration variables, the *number of events with Meridonare* (reflecting those events organized by Meridonare) is a positive predictor of the respective measure of crowdfunding success in each of our models, while the corresponding sign on the coefficient for the *number of autonomous events* (reflecting those events organized independently by the promoter) is positive and significant only in models specifications (3) and (4). Meridonare's ability to preliminarily assess the goodness of the project (i.e., *evaluation range*) and the duration of the campaign (i.e., *number of months of campaign*) also prove to be positive and significant in all model specifications.

With regard to the explanatory power of our models, the R^2 and F (or chi-square) scores for every model specification show that our predictor variables explain a substantial and significant portion of the variation of the dependent variables. All models have a robust regression R^2 of over 50%, suggesting that the model is useful in explaining a substantial portion of the variance of the of campaign success.

Our findings support the role that a SCF (such as Meridonare) plays in the specific economic, cultural, and geographical context in which it operates, and assumes particular relevance for the practice of social entrepreneurship by providing a service for the organization of promotional events. It follows that our first assumption about the importance

Table 9.2 The baseline model—campaign dimension

Variables	*(1) Probit model for* success campaign	*(2) Probit model for* success campaign	*(3) OLS model for* funding	*(4) OLS model for* funding	*(5) OLS model for* funding ratio	*(6) OLS model for* funding ratio
Number of events with Meridonare	0.792	0.779	**1.130*** **	**1.021** **	0.068	**0.086***
	(0.524)	(0.593)	(0.398)	(0.418)	(0.050)	(0.052)
Number of views on Meridonare website	**–0.000** **	**–0.000** **	–0.000	**–0.000***	–0.000	–0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of articles on Meridonare news	**–1.575*** **	**–1.604*** **	**– 0.717***	–0.468	**–0.087***	**–0.099***
	(0.570)	(0.556)	(0.398)	(0.415)	(0.052)	(0.056)
Number of autonomous events	0.049	0.034	**1.195*** **	**1.114** **	–0.026	–0.011
	(0.554)	(0.535)	(0.416)	(0.446)	(0.042)	(0.042)
Number of total events	**–0.137** **	**–0.136** **	0.047	0.066	0.003	0.000
	(0.067)	(0.064)	(0.043)	(0.040)	(0.005)	(0.005)
Number of total social contacts	–0.000	–0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of total articles	**–0.094*** **	**–0.095*** **	–0.025	–0.017	**–0.007** **	**–0.008** **
	(0.034)	(0.034)	(0.022)	(0.022)	(0.003)	(0.003)
Number of donors	0.001	0.001	**0.005*** **	**0.006*** **	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)
Number of months of campaign	**0.367** **	**0.365** **	**0.303*** **	**0.258** **	**0.023***	**0.027***

Variables	*(1)* *Probit model for* success campaign	*(2)* *Probit model for* success campaign	*(3)* *OLS model for* funding	*(4)* *OLS model for* funding	*(5)* *OLS model for* funding ratio	*(6)* *OLS model for* funding ratio
	(0.153)	(0.152)	(0.113)	(0.114)	(0.014)	(0.014)
Evaluation range	**2.171*** **		**1.112*** **		**0.208*** **	
	(0.376)		(0.160)		(0.017)	
Observations	138	138	138	138	138	138
R^2/Pseudo R^2	0.657	0.658	0.62	0.63	0.74	0.76
Yearly FE	YES	YES	YES	YES	YES	YES
Rating FE	NO	YES	NO	YES	NO	YES

Robust standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table 9.3 The baseline model—foundation dimension

Variables	*(1) Probit model for* success campaign	*(2) Probit model for* success campaign	*(3) OLS model for* funding	*(4) OLS model for* funding	*(5) OLS model for* funding ratio	*(6) OLS model for* funding ratio
Number of events with Meridonare	**–1.585****	**–1.520****	0.091	0.082	–0.003	–0.007
	(0.810)	(0.796)	(0.953)	(1.002)	(0.038)	(0.041)
Number of views on Meridonare website	**0.001*****	**0.001****	–0.000	–0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of articles on Meridonare news	**–1.774****	**–1.667****	**–2.666*****	**– 2.335****	**–0.107*****	**–0.103****
	(0.779)	(0.816)	(1.010)	(1.036)	(0.038)	(0.040)
Number of autonomous events	–0.072	–0.077	0.360	0.369	–0.005	–0.008
	(0.389)	(0.376)	(0.779)	(0.788)	(0.036)	(0.038)
Number of total events	**0.148***	**0.153***	0.002	0.014	–0.005	–0.004
	(0.086)	(0.082)	(0.099)	(0.097)	(0.004)	(0.005)
Number of total social contacts	**–0.002*****	**–0.002*****	–0.000	–0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of total articles	0.020	0.023	–0.068	–0.061	–0.004	–0.004
	(0.046)	(0.048)	(0.063)	(0.066)	(0.003)	(0.003)
Number of donors	–0.002	–0.002	0.000	0.001	–0.000	–0.000
	(0.002)	(0.002)	(0.005)	(0.005)	(0.000)	(0.000)
Number of months of campaign	–0.048	–0.054	**0.433***	**0.388***	–0.002	–0.003

Variables	*(1)* *Probit model for* success campaign	*(2)* *Probit model for* success campaign	*(3)* *OLS model for* funding	*(4)* *OLS model for* funding	*(5)* *OLS model for* funding ratio	*(6)* *OLS model for* funding ratio
	(0.131)	(0.131)	(0.231)	(0.226)	(0.010)	(0.009)
Evaluation range	**1.103*** **		**1.905*** **		**0.094*** **	
	(0.249)		(0.341)		(0.018)	
Observations	138	138	138	138	138	138
R^2/Pseudo R^2	0.553	0.553	0.47	0.47	0.41	0.42
Yearly FE	YES	YES	YES	YES	YES	YES
Rating FE	NO	YES	NO	YES	NO	YES

Robust standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

of collaboration between the project's promoters and the platform in determining the success of the fundraising is confirmed.

In terms of community variables, our results confirm our second research assumption by highlighting the importance of the human factor in the actions that support the financing of the social project. In each of our model specifications, both the communicative and the technological dimensions do not seem to be decisive. The use of media channels, both traditional and through digital and social channels, appears marginal: the *total number of articles* shows a significant negative coefficient effect in most of the models, particularly in model specifications (1) and (2), while the contribution of the *number of social contacts* social contacts is completely neutral. At the same time, a negative and significant coefficient effect is shown in most of our estimated models for the variables that reflect digital communication, notably for the *number of articles on Meridonare news*.

A crucial element that emerges from our research, not without surprise, is the relative digital immaturity of the social crowdfunding market. Promoting the campaign through digital communication does not seem so crucial in fostering community engagement to support social crowdfunding initiatives to attract the crowd of potential donors. As a result, *human touch* still represents a good empathic connection tool within a community that increases the likelihood of receiving fund from community members. Consequently, physical actions that emphasize cultural and social correspondence with community values are more likely to generate population involvement.

Table 9.3 shows the model estimates for "FBN dimension", examining whether the characteristics of the campaign and the level of collaboration between stakeholders could positively or negatively influence the Foundation's intervention in providing financial support to the campaign.

Observing the signs of the coefficients and their statistical significance of independent variables such as the *number of events with Meridonare* and the *number of articles on Meridonare news*, it emerges that the stronger the collaboration between the SCF and the promoters of the social project (both physical and digital), the less the need for intervention by the FBN. Meridonare's financial support does not take place within an obscure and disorganized process, but it is integrated into a step-by-step evaluation mechanism shared with the project proponents right from the planning phase of the proposal (Gallucci et al., 2018). The sharing of evaluation mechanisms helps to implement targeted actions for campaigns that fail to

reach the target budget autonomously. The result is a negative correlation between the success of Meridonare's actions to promote the campaign and the necessity for the Foundation, owner of the platform, to intervene in supporting projects that are not successful on an independent basis.

Our results confirm Meridonare's role as an "amplifier" of the FBN's philanthropic activity. Direct investment in the social crowdfunding platform not only works, but also it allows the Foundation to expand the impact of its charitable activity throughout the territory by increasing the scope of its social purpose. The amount of unused funds, generated by the non-financing of the campaigns that succeed on their own on the Meridonare platform, allows the Foundation to concentrate its financial support on other worthy social projects in the local territory. Therefore, the search for new investment approaches strengthens the role of an institutional force, such as the Banking Foundation, in building a social entrepreneurial ecosystem, therefore confirming our third research assumption.

Discussion and Conclusions

The results of the analysis conducted on Meridonare platform highlight some novelties in the social crowdfunding debate. By exploring how the crowdfunding platform triggers the success of social projects, our work contributes to a better understanding of the role and activities performed by institutional forces in building a social enterprise environment.

Our findings reveal that the success of single projects heavily depends on the intensity of the platform's collaboration and its ability to operate as a control and coordination tool. While traditional crowdfunding platforms operate in a two-sided market (Mcintyre & Srinivasan, 2017), SCF not only facilitates the interaction between lenders and fundraisers, but also it stimulates the construction of a culture and shared values which, in the case of Meridonare, find further emphasis in being the property of a Foundation of Banking Origin (Presenza et al., 2019). As a direct investment of the foundation, Meridonare contributes to applying its social principles by expanding the intensity of the collaboration with the actors involved in the crowdfunding campaign. The ability of the SCF to coordinate the roles of the various actors by acting as an anchor (Lappi et al., 2017) and a builder of collaborations to evaluate *ex-ante* the criticalities of the social project and to complete the lesser knowledge of the promoters on the activities that precede and follow the crowdfunding

campaign, allows to obtain better results than the autonomous action of the promoters. The outcome takes shape not only in enhancing the success of the campaigns, but also in helping to create culture and social values, and to implement a sense of local community.

In this perspective, the platform functions simultaneously as a social change agent and as a community developer whose ability is to wisely measure technical skills (such as planning, finance, marketing, and technology, among others) and relationships with a high human content. In the context of social crowdfunding, understanding the role of the factors that determine the level of community involvement assumes particular importance (Josefy et al., 2017) because the success of a social innovation project does not depend only on the availability of financial resources, but also on social acceptance by the local context (not just donors). As Presenza et al. (2019) note, this condition requires the SCF platform to undertake specific actions (e.g., *ad hoc* communication campaigns, creativity).

An important point that emerges from our study is that the charitable market is still digitally immature. This means that the community of those who are sensitive to the theme of charity and willing to make monetary donations does not automatically move to the web and actively participate in crowdfunding with the same intensity as they previously participated in "in-person" donation opportunities. The donors' sensibility is not indifferent to the tool used to engage them. Those who are willing to donate for charity remain sensitive to human touch even when the process moves to the web through crowdfunding. In this sense, our results provide evidence that the support action developed by the platform in promoting high human touch relationship is more important than the community itself intended as a potential network of willing donors. This means that potential donors' predisposition to altruism and the technological platform *per se* are not sufficient to trigger donation. It is necessary for the social crowdfunding platform to plan initiatives that stimulate interest in donating on specific occasions. According to our case study, the use of the multimedia totem (donamat) is a clear example of an action, coordinated by Meridonare, capable of enhancing the combination of physical and digital elements: the installation of the donamat in *ad hoc* events allows to effectively represent the campaign and gives to potential donors the opportunity to contribute immediately.

Our study highlights the different forms of the impact of institutional forces in promoting social crowdfunding. From an operational standpoint, it should be noted that social crowdfunding platforms have a harder time making profits than reward-based crowdfunding. In this specific case, Meridonare had higher than average costs because the size of its staff was greater than its peers due to the additional personnel needed to activate the free-of-charge support services essential for the campaign success. The proponents of social innovation projects are small non-profit organizations, which have little ability to operate on the market, develop an effective marketing plan, and manage financial resources. Therefore, the support of the SCF platform is not limited only to providing visibility to the promoters of the project, but also to accompanying them in the entire phase that precedes and follows the crowdfunding campaign. Compared to lending and equity crowdfunding platforms, the team that manages the social crowdfunding platform cannot adopt passive behaviors but must apply an active approach in offering services to non-profit organizations that use the platform. The support of the banking foundation is thus crucial to enable the platform to function.

Although it is a direct investment, the Foundation has no return objectives linked to the SCF. The Foundation, in fact, as the owner of the platform, does not seek a monetary return, but considers Meridonare as a useful tool to amplify the impact of its philanthropic activity thanks to the crowdfunding operations carried out by the platform. The Foundation has indeed achieved an important social leverage effect through the creation and management of the social crowdfunding platform. It has ensured that the social impact on the territory has increased by 300% compared to what would have been obtained without the existence of Meridonare, thanks to the donations collected through the platform that were added to the budget on which the Foundation structurally invests direct charity.

This study's limitations pave the way for future research in this area. Firstly, as this is a case study review, only a small number of observed cases are available, which could affect the power of our model and limit the number of variables used in our empirical analysis. Secondly, the localization in terms of geography boundaries of the sample makes it an ideal context for our analysis, but at the same time represents a source of potential limitation. In fact, for many crowdfunding projects, the target community of potential supporters is defined not by geography, but by the nature of the project or the networks of its founder. Many of these

communities are virtual communities, built around common interests although not common locations. In this perspective, it becomes necessary to consider whether our results are equally applicable to virtual communities that transcend physical boundaries. Lastly, scholars might benefit from considering other crowdfunding platforms, also from other countries, and exploring similarities and differences among them.

Despite these limitations, our study offers novel evidence of an explanatory case that contains ideas and insights that can find useful application in other experiences of social entrepreneurship. Social entrepreneurship has a real and growing impact on the world of business practices, philanthropic foundations, and investors' behavior. By investigating the success factors of social crowdfunding in a new investigation perspective, our work helps to better understand the consequences of social investments made through a crowdfunding platform in which an institutional force plays a decisive role. This study is useful for researchers, policy makers, and practitioners to evaluate the effectiveness of the interaction in social investment on the platform and to assess under which conditions, such as support services and reward mechanisms, social crowdfunding is best applied in strengthening its philanthropic activity.

The investigation of a new approach in an area of growing curiosity contributes to enrich a research path with novel insights corroborated by our findings (Shepherd & Wiklund, 2020). Replication studies between platforms and geographic contexts are also necessary to estimate the size of the effects between the different studies. As existing theories are tested and previous results replicated, new questions will emerge that require different types of approaches (Pollack et al., 2021) that are functional to mitigate territorial relationships that can represent a barrier to growth as expansion towards other geographical areas would imply an inevitable separation of the platform from the local community.

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CHAPTER 10

Financial Inclusion and the Gender Gap Across Islamic and Non-Islamic Countries

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Introduction

Financial inclusion refers to the ability of individuals and businesses to access useful and affordable financial products and services that meet their needs, such as loans, insurance, and pension. The World Bank has highlighted that financial inclusion can help achieve eight of the seventeen United Nation's Sustainable Development Goals (UN SDGs) including

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reducing poverty and promoting gender equality.[1] The increased access to and use of financial services in developing countries and by women is, in turn, expected to enhance economic security and prosperity, decrease income inequality, and maintain financial stability (Trivelli et al., 2018). Financial markets can thrive when financial systems become more inclusive and may have a greater impact on monetary, fiscal, macro-prudential, and macro-structural policies (Sahay & Cihak, 2018).

Despite the importance of financial inclusion, around 1.4 billion people worldwide are identified as "unbanked", that is, they do not own a formal transaction account, a crucial measure of financial inclusion (World Bank's Global Findex 2021). Socio-cultural and institutional factors, including the role of religion, can act as obstacles to financial inclusion, particularly for some groups, such as women. The literature suggests that Muslims are less likely to own an account and save at a formal financial institution compared to non-Muslims, with religious reasons being possible strong motives for their decisions (Bhattacharaya & Wolde, 2010; Demirgüç-Kunt et al., 2013; Lee & Ullah, 2011; Okumuş, 2005; Sain et al., 2016).

This chapter sets out to provide a summary of the recent developments in the literature on the determinants of financial inclusion in general and then specifically for Islamic versus non-Islamic countries. It also surveys the extant literature discussing the gender gap in financial inclusion across the two groups of countries. In the second part, the chapter explores the patterns of financial inclusion and considers potential determinants of financial inclusion across five dimensions: macro-economic, social, institutional, banking, and technological.

We use a sample of 56 Islamic and 101 non-Islamic countries over the period 2011 to 2017 and collect financial inclusion data from the World Bank's Global Findex database.[2] The analysis offers some interesting insights: first, we show that financial inclusion, proxied by "account ownership", is still relatively low across the sample, but it is particularly challenging in the sampled Islamic countries and for women. Our

[1] The SDGs were adopted in 2015 by the United Nations and they are a collection of 17 "global goals" aimed at ending poverty, protecting the planet, and ensuring prosperity of all people by 2030 (https://sdgs.un.org/).

[2] The Global Financial Inclusion (Global Findex) database is the world's most comprehensive source of data on saving, borrowing, making payments, and managing risks among adults. The data set has been published every three years since 2011; it is gathered from more than 150,000 adults in over 140 economies which are part of nationally representative surveys (see https://globalfindex.worldbank.org/).

study also suggests that among the potential determinants of financial exclusion in Islamic countries compared to their non-Islamic counterparts are macro-economic factors such as low GDP per capita, social factors such as low human development, gender inequality, and discrimination against women in employment, institutional environment including weak regulation, low government integrity, and corruption, banking market conditions such as low competition, and technology including a low usage of internet and mobile phone services.

The chapter is structured as follows. Section 'Selected Literature' offers a brief overview of the relevant literature on financial inclusion and its determinants, its relationship with Islamic banking and gender gap issues therein. Section 'Data, Variables, and Descriptive Analysis' presents the data and descriptive analysis. The final Section 'Concluding Remarks' concludes and offers some policy implications and avenues for future research.

Selected Literature

Determinants of Financial Inclusion

The determinants of financial inclusion have been studied both at an individual level (e.g., Allen et al., 2012; Fungácová & Weill, 2015; Kostov et al., 2015) and, possibly more often, at the country level (e.g., Allen et al., 2012; Ardic et al., 2011; Beck et al., 2007; Demirgüç-Kunt et al., 2013; Honohan, 2008; Kabakova & Plaksenkov, 2018; Owen & Pereira, 2018; Park & Mercado, 2018; Rojas-Suarez, 2010).

Individual-level factors that have been shown to positively correlate with access to formal financial services include education, wealth and income, employment, age, urbanity, marital status, financial literacy, and business experience. In terms of gender, unsurprisingly, the evidence collected in the surveyed studies shows that men are typically more likely to be financially included, while women tend to be excluded, often due to lack of official identification and the widespread use of shared accounts with family members which in turn leads to women's higher usage of "informal" financial services.

At the country level, among the main variables that have been found to positively affect financial inclusion are economic development, institutional factors (such as the rule of law and governance indicators), the extent of mobile phone penetration, legal rights, bank competition, and

social development. In contrast, the variables that tend to associate negatively with access to finance and financial services typically include macroeconomic instability, inflation volatility, banking system inefficiency and banking market concentration, overhead costs, inadequate technology, low political development, income inequality, regulatory constraints, and weak legal systems. Interestingly, population density has been found to be both positively and negatively associated with financial inclusion. This is presumably the result of the differences in obstacles to accessing financial services across low- and high-income countries. The latter countries, despite their population density, can provide a greater access to banking services because of their more advanced economic systems compared to low-income countries. Overall, the findings in most studies reviewed here suggest that low-income countries would require better access to financial intermediaries and technological infrastructure to enable better financial inclusion.

Islamic Banking and Financial Inclusion

Over the past four decades or so, Islamic banking and finance have been growing fast, providing a variety of financial products and services, which eventually spread even in non-Islamic countries. Islamic banking is based and governed by the values and principles of Islamic sharia. Compared to conventional banks, Islamic banks are interest-free, and depositors are considered as investors.[3] One of its main mechanisms in supporting financial inclusion is its continuous aim at promoting charity among the rich and the circulation of money to bridge the gap between the different social classes; it is based on risk-sharing principles whereby lenders and borrowers share the outcome of the business or asset being financed, whether profit or loss. As pointed out by Beck et al. (2020), this system helps to stabilise the boom-bust cycles in the economy, creating a more just and equitable society, because the distribution of profit and loss is a function of the risks borne by each agent.

According to Ahmed et al. (2015), Islamic finance shows evidence of becoming a vital part of the global financial system. It contributes towards

[3] For an introduction to Islamic banking, see Casu et al. (2021).

alleviating the problems of low economic growth and poverty in low-income countries by providing access to financial services that help the poorer households and facilitate the creation of micro-enterprises.

Existing studies examine the role of Islamic finance and the Islamic-compliant financial products and services in improving the broader financial inclusion among Muslim groups (e.g., Bose et al., 2016; Demirgüç-Kunt et al., 2013; Elzahi, 2015; Leon & Weill, 2018; Mohieldin et al., 2012; Morrissey, 2012; Naceur et al., 2015; Usman & Tasmin, 2016), while others focus on the effect of religious beliefs on using financial services (Ghoul, 2011; Onakoya & Onakoya, 2014; Zulkhibri, 2016).

Overall, studies on Islamic banking and finance are relatively limited, and most of them have been carried out over the past ten years or so. The majority report a positive relationship between Islamic finance and financial inclusion. This is often related to the unique micro-financial qualities of the Islamic banking system that ensures sharing risks in investments, providing support to small businesses and larger firms as well as loans to the poor, and reducing the level of social inequality through Islamic products like *qard al-hassan, waqf*, and *zakat* (Zulkhibri, 2016).[4] Despite this positive impact on financial inclusion in the Muslim-majority countries, many Muslim adults are financially excluded either because of their religious stance on accounts in traditional banks that do not comply with sharia law (for instance, providing interest) or due to a lack or unawareness of Islamic services and products provided in their regions.

Financial Inclusion and the Gender Gap

Women's access to finance is essential at many levels in the contemporary world. There is evidence, starting from the early 2000s, that it is lower than that for men across many countries; this reflects social inequality

[4] In Islamic finance, *qard al-hassan* is essentially a non-rewarding (interest-free) loan that is provided on a goodwill basis to those who need financial assistance, in line with sharia rules that dictate that interest (*riba*) payments are not permissible; *waqf* is a charitable endowment that typically involves assets that are donated for being held in trust, with no intention of reclaiming them, for charitable causes that are socially beneficial; and *zakat* refers to an obligatory contribution or tax which is prescribed by Islam on all Muslim people having wealth above an exemption limit at a rate fixed by the sharia.

and gender discrimination prevalent in the economic sphere. Cheston and Kuhn (2002) illustrate the essential value of women's equal access to finance and its potential as an instrument to increase their socio-economic and political security and engagement (see also Aterido et al., 2011; Staveren, 2001; Swamy, 2014). By 2010, across developing countries and all income groups, only 37 per cent of women had a formal bank account at a financial institution compared to 46 per cent of men (Allen et al., 2012).

A number of studies have examined the relationship between access to finance and gender, either at individual-level characteristics or country-level data. The latter covers both less developed, mainly African and South Asian regions, and developed countries. These studies have used various methods in their analysis, including OLS, multivariate, and probability models. Similarly, data have been collected from different sources depending on the initial objective, including surveys such as the Global Findex and the Financial Access Survey (FAS) that was launched in 2009 by the International Monetary Fund.

The vast majority of studies find that women generally have less access to financial services than men, because of social inequality, differences in education, employment, and income, and legal restrictions on women's rights. The gender gap has proven to be one of the reasons behind the weak economic growth in many regions, particularly the less developed ones (e.g., Adegbite & Machethe, 2020; Delechat et al., 2018; Demirgüc-Kunt et al., 2013; Gonzales et al., 2015; Hakuna et al., 2016; Klasen & Lamanna, 2009; Muravyev et al., 2009; Sahay & Cihak, 2018). The literature suggests that providing equal access to financial services for women is tied to providing them with more legislative protection against discrimination in the workplace and/or at the family level.

The above-mentioned studies, however, do not address the gender gap in financial inclusion across Islamic and non-Islamic countries. Our study contributes to this literature by adding an overall exploratory view on financial inclusion across Islamic and non-Islamic countries and by considering the gender gap as an important variable in our analysis along with a wide spectrum of factors across a large sample of countries.

Data, Variables, and Descriptive Analysis

Data and Variables

This study relies on a cross-country sample of a total of 157 countries over the period 2011–2017. It comprises 101 non-Islamic countries and 56 Islamic countries that are members of the Organisation of Islamic Cooperation (OIC) that represents Muslim-majority countries.[5] The list of countries included in our sample is provided in Table 10.1.

Our data are collected from a number of sources, namely, the World Bank's Global Findex, World Development Indicators, Global Financial Development, and Women, Business, and the Law databases, UN Human Development reports, Fraser Institute, and Heritage Foundation. The financial inclusion data provided by the Global Findex database are available for the years 2011, 2014, and 2017. Following the literature (e.g., Sha'ban et al., 2020), we replace the missing years (that is, 2012, 2013, 2015, and 2016) with the data from the respective preceding year. We then winsorise all variables at 1 per cent level at the top and bottom of the distribution to mitigate the influence of the outliers.

Financial inclusion can be measured in different ways. The main types of indicators used in the literature are typically divided into access, usage, and quality measures.[6] Our financial inclusion measure, *Account ownership*, reflects access to financial services and is represented by the percentage of all respondents who report having an account at a financial institution. We categorise the potential determinants of financial inclusion into five different groups: macro-economic, social, institutional, banking, and technological. Table 10.2 provides the description of the variables included in our analysis and details the data sources.

[5] The number of Islamic countries in our sample is relatively low due to their limited financial inclusion data.

[6] *Access* indicators reflect the depth of outreach of financial services (such as the penetration of bank branches and automated teller machines (ATMs)), in addition to barriers faced by customers such as transaction costs and information. *Usage* indicators measure the depth of use of financial services and products (such as the number of accounts, transactions, and electronic payments). *Quality* indicators measure the extent to which financial products and services meet customers' needs and understanding. For more details see World Bank (2015).

Table 10.1 List of sampled countries

	Country	*Group*		*Country*	*Group*		*Country*	*Group*		*Country*	*Group*
1	Afghanistan	Islamic	41	Djibouti	Islamic	81	Lesotho	Non-Islamic	121	Saudi Arabia	Islamic
2	Albania	Islamic	42	Dominican Republic	Non-Islamic	82	Liberia	Non-Islamic	122	Senegal	Islamic
3	Algeria	Islamic	43	Ecuador	Non-Islamic	83	Libya	Islamic	123	Serbia	Non-Islamic
4	Angola	Non-Islamic	44	Egypt, Arab Rep	Islamic	84	Lithuania	Non-Islamic	124	Sierra Leone	Islamic
5	Argentina	Non-Islamic	45	El Salvador	Non-Islamic	85	Luxembourg	Non-Islamic	125	Singapore	Non-Islamic
6	Armenia	Non-Islamic	46	Estonia	Non-Islamic	86	Madagascar	Non-Islamic	126	Slovak Republic	Non-Islamic
7	Australia	Non-Islamic	47	Eswatini	Non-Islamic	87	Malawi	Non-Islamic	127	Slovenia	Non-Islamic
8	Austria	Non-Islamic	48	Ethiopia	Non-Islamic	88	Malaysia	Islamic	128	Somalia	Islamic
9	Azerbaijan	Islamic	49	Finland	Non-Islamic	89	Mali	Islamic	129	South Africa	Non-Islamic
10	Bahrain	Islamic	50	France	Non-Islamic	90	Malta	Non-Islamic	130	South Asia	Non-Islamic
11	Bangladesh	Islamic	51	Gabon	Islamic	91	Mauritania	Islamic	131	Suriname	Islamic
12	Belarus	Non-Islamic	52	Georgia	Non-Islamic	92	Maldives	Islamic	132	Spain	Non-Islamic
13	Belgium	Non-Islamic	53	Germany	Non-Islamic	93	Mexico	Non-Islamic	133	Sri Lanka	Non-Islamic
14	Belize	Non-Islamic	54	Ghana	Non-Islamic	94	Moldova	Non-Islamic	134	Sudan	Islamic
15	Benin	Islamic	55	Greece	Non-Islamic	95	Mongolia	Non-Islamic	135	Sweden	Non-Islamic
16	Bhutan	Non-Islamic	56	Gambia	Islamic	96	Montenegro	Non-Islamic	136	Switzerland	Non-Islamic
17	Bolivia	Non-Islamic	57	Guinea	Islamic	97	Morocco	Islamic	137	Syrian Arab Republic	Non-Islamic
18	Brunei	Islamic	58	Guinea-Bissau	Islamic	98	Mozambique	Islamic	138	Tajikistan	Islamic
19	Botswana	Non-Islamic	59	Guyana	Islamic	99	Myanmar	Non-Islamic	139	Tanzania	Non-Islamic
20	Brazil	Non-Islamic	60	Hong Kong SAR, China	Non-Islamic	100	Namibia	Non-Islamic	140	Thailand	Non-Islamic
21	Bulgaria	Non-Islamic	61	Hungary	Non-Islamic	101	Nepal	Non-Islamic	141	Togo	Islamic
22	Burkina Faso	Islamic	62	India	Non-Islamic	102	Netherlands	Non-Islamic	142	Tunisia	Islamic

	Country	*Group*		*Country*	*Group*		*Country*	*Group*		*Country*	*Group*
23	Brunei	Islamic	63	Indonesia	Islamic	103	New Zealand	Non-Islamic	143	Turkey	Islamic
24	Cambodia	Non-Islamic	64	Iran, Islamic Rep	Islamic	104	Nicaragua	Non-Islamic	144	Turkmenistan	Islamic
25	Cameroon	Islamic	65	Iraq	Islamic	105	Niger	Islamic	145	Uganda	Islamic
26	Canada	Non-Islamic	66	Ireland	Non-Islamic	106	Nigeria	Islamic	146	Ukraine	Non-Islamic
27	Central African Republic	Non-Islamic	67	Israel	Non-Islamic	107	Norway	Non-Islamic	147	United Arab Emirates	Islamic
28	Chad	Islamic	68	Italy	Non-Islamic	108	Oman	Islamic	148	United Kingdom	Non-Islamic
29	Chile	Non-Islamic	69	Jamaica	Non-Islamic	109	Pakistan	Islamic	149	United States	Non-Islamic
30	China	Non-Islamic	70	Japan	Non-Islamic	110	Panama	Non-Islamic	150	Uruguay	Non-Islamic
31	Colombia	Non-Islamic	71	Jordan	Islamic	111	Paraguay	Non-Islamic	151	Uzbekistan	Islamic
32	Comoros	Islamic	72	Kazakhstan	Islamic	112	Peru	Non-Islamic	152	Venezuela, RB	Non-Islamic
33	Congo, Dem. Rep	Non-Islamic	73	Kenya	Non-Islamic	113	Philippines	Non-Islamic	153	Vietnam	Non-Islamic
34	Congo, Rep	Non-Islamic	74	Korea, Rep	Non-Islamic	114	Poland	Non-Islamic	154	West Bank and Gaza	Islamic
35	Costa Rica	Non-Islamic	75	Kosovo	Non-Islamic	115	Portugal	Non-Islamic	155	Yemen, Rep	Islamic
36	Cote d'Ivoire	Islamic	76	Kuwait	Islamic	116	Puerto Rico	Non-Islamic	156	Zambia	Non-Islamic
37	Croatia	Non-Islamic	77	Kyrgyz Republic	Islamic	117	Qatar	Islamic	157	Zimbabwe	Non-Islamic
38	Cyprus	Non-Islamic	78	Lao PDR	Non-Islamic	118	Romania	Non-Islamic			
39	Czech Republic	Non-Islamic	79	Latvia	Non-Islamic	119	Russian Federation	Non-Islamic			
40	Denmark	Non-Islamic	80	Lebanon	Islamic	120	Rwanda	Non-Islamic			

Note The table presents the list of countries included in the sample and their classification into Islamic and non-Islamic countries. A country is classified as Islamic if it is a member of the Organisation of Islamic Cooperation (OIC), and Non-Islamic otherwise

Table 10.2 Definition of variables

Variable	*Description*	*Source*
Financial inclusion		
Account ownership	Percentage of respondents who report having an account at a financial institution. It is an indicator of financial inclusion	Global Findex (World Bank)
Account ownership (F)	Percentage of female respondents who report having an account at a financial institution	Global Findex (World Bank)
Account ownership (M)	Percentage of male respondents who report having an account at a financial institution	Global Findex (World Bank)
Macro-economic factors		
GDP per capita (log)	Gross domestic product divided by mid-year population (natural logarithm)	World Development Indicators (World Bank)
Inflation	Annual percentage change in an average consumer price index	World Development Indicators (World Bank)
Social factors		
Human development index	Human development index that summarises average achievement in key dimensions of human development: health, knowledge, and standard of living. It ranges between 0 and 1, where higher values indicate higher human development	UN Human Development Reports

Variable	*Description*	*Source*
Gender inequality	The index reflects gender-based disadvantage in three dimensions: reproductive health, empowerment, and labour market. It ranges between 0 and 1, where 0 indicates gender equality (i.e., that women fare equally in comparison to men) and 1 indicates gender inequality (women fare poorly in comparison to men)	UN Human Development Report
Non-discrimination	Non-discrimination against women in employment based on whether the law mandates non-discrimination. It takes values of 0 or 1, where 0 indicates that the law does not prohibit discrimination in employment based on gender and 1 indicates that the law prohibits discrimination	Women, Business and the Law (World Bank)
Institutional factors		
Regulation	Regulation covers three components: credit market regulations, labour market regulations, and business regulations. It ranges between 0 and 100, where 0 indicates weak regulation and 100 indicates strict regulation	Fraser Institute

(continued)

Table 10.2 (continued)

Variable	*Description*	*Source*
Government integrity	Average score for the following factors: public trust in politicians, irregular payments and bribes, transparency of government policymaking, absence of corruption, perceptions of corruption, and governmental and civil policy transparency (all weighted equally). It ranges between 0 and 100, where higher values indicate higher government integrity	Heritage Foundation
(Lack of) corruption	The indicator is a composite index based on a combination of surveys and assessments of corruption from 13 different sources and scores countries based on how corrupt a country's public sector is perceived to be. It ranges between 0 and 100, where 0 indicates a high level of corruption and 100 indicates no corruption	World Development Indicators (World Bank)
Banking factors		
Market concentration (CR5)	The degree of concentration of deposits in the 5 largest banks (CR5)	Global Financial Development (World Bank)
Market power index (Lerner)	A measure of market power in the banking market. It is defined as the difference between output prices and marginal costs (relative to prices)	Global Financial Development (World Bank)

Variable	*Description*	*Source*
(Lack of) competition indicator (Boone)	A measure of degree of competition based on profit-efficiency in the banking market. It is calculated as the elasticity of profits to marginal costs. An increase in the Boone indicator implies a deterioration of the competitive conduct of financial intermediaries	Global Financial Development (World Bank)
Technological factors		
Individuals using the internet (per cent)	Individuals who have used the Internet (from any location) in the last 3 months (per cent of population). The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV, etc	World Development Indicators (World Bank)
Mobile subscriptions (ml)	Subscriptions to a public mobile telephone service that provides access to the PSTN using cellular technology	World Development Indicators (World Bank)

Notes The table presents the definition and data source for the variables used in the study

Descriptive Analysis

Table 10.3 reports the descriptive statistics for the full sample. The mean for *Account ownership* is around 51.7 per cent which suggests that just over half of respondents declare having an account at a financial institution. There is a wide disparity in financial inclusion across countries in our sample. For example, account ownership ranges from just under 100 per cent for countries such as Denmark (99.9 per cent) and Canada (99.8 per cent) to only 3.3 per cent in the Central African Republic and 3.8 per cent in Cambodia. Importantly, account ownership is significantly lower for women (around 48.7 per cent) compared to their male counterparts (around 54.5 per cent) with a gap of 5.8 per cent. The highest female account ownership is observed in Norway (100 per cent) whereas the lowest is in the Republic of Yemen (around 1.7 per cent).

Figure 10.1 shows that although financial inclusion has increased slightly over time in our sample, there is a persistent gender gap in account ownership, particularly in Islamic countries.

The observed gender gap in financial inclusion can be explained by voluntary and involuntary barriers. Voluntary barriers often refer to religious and cultural reasons, as well as social circumstances where the need for an account is absent (Allen et al., 2016; Demirgüç-Kunt et al., 2008; Demirgüc-Kunt et al., 2015). Involuntary barriers can include cases of gender discrimination, lack of information and understanding of product features, as well as price barriers (Alhassan, 2019).

Table 10.4 reports the correlation between our financial inclusion indicator (account ownership, aggregate and by gender) and the selected indicators described in Table 10.2 that capture a variety of macroeconomic, social, institutional, banking, and technological factors. We find that financial inclusion is positively correlated with GDP per capita, human development, non-discrimination against women in employment, regulation, government integrity, lack of corruption, and internet usage, and is negatively correlated with inflation and gender inequality. These relationships hold for both aggregate and female and male account ownership.

Next, we examine the variation in financial inclusion (aggregate and by gender) and its potential determinants across Islamic and non-Islamic countries using a difference in means test (t-test). The results are reported in Table 10.5.

Table 10.3 Descriptive statistics

Variables	*Obs*	*Mean*	*Standard Deviation*	*Min*	*Max*
Financial inclusion					
Account ownership	991	51.65	31.11	3.30	99.92
Account ownership (F)	991	48.72	32.17	1.67	100.00
Account ownership (M)	991	54.53	30.47	3.19	100.00
Macro-economic factors					
GDP per capita (log)	984	8.65	1.46	5.76	11.35
Inflation	952	4.71	5.82	–1.54	36.91
Social factors					
Human development index	957	0.71	0.16	0.37	0.94
Gender inequality	884	0.36	0.19	0.04	0.71
Non-discrimination	962	0.78	0.41	0.00	1.00
Institutional factors					
Regulation	906	7.01	1.00	4.12	9.13
Government integrity	961	41.63	20.97	8.00	93.00
(Lack of) corruption	628	36.35	23.92	1.94	90.00
Banking factors					
Market concentration (CR5)	921	63.22	18.69	23.02	100.00
Market power index (Lerner)	386	0.31	0.15	0.01	1.13
(Lack of) competition (Boone)	537	0.80	7.19	–1.61	63.03
Technological factors					
Individuals using the internet (per cent)	984	45.73	28.99	1.38	96.36
Mobile subscriptions (ml)	984	55.36	165.19	0.52	1190.25

Note The table presents summary statistics (number of observations, mean, standard deviation, and minimum and maximum values) for the full sample over the period from 2011 to 2017. All variables are winsorised at 1 per cent level. See Table 10.2 for variable definitions and data sources

We observe a significant difference in account ownership between the two sub-samples, with 60.5 per cent of respondents in non-Islamic countries reporting having an account compared to just 34.4 per cent in Islamic countries. Men across both country groups tend to have a greater level of account ownership compared to women; however, the gender gap is considerably higher in Islamic countries, amounting to approximately 10 per cent compared to about 5 per cent in non-Islamic countries.

Looking at the factors that might be driving the gap in financial inclusion between Islamic and non-Islamic countries, we find pronounced differences across the five dimensions examined. Specifically, we find that Islamic countries tend to have a lower level of economic development as evidenced by their lower GDP per capita. In the social

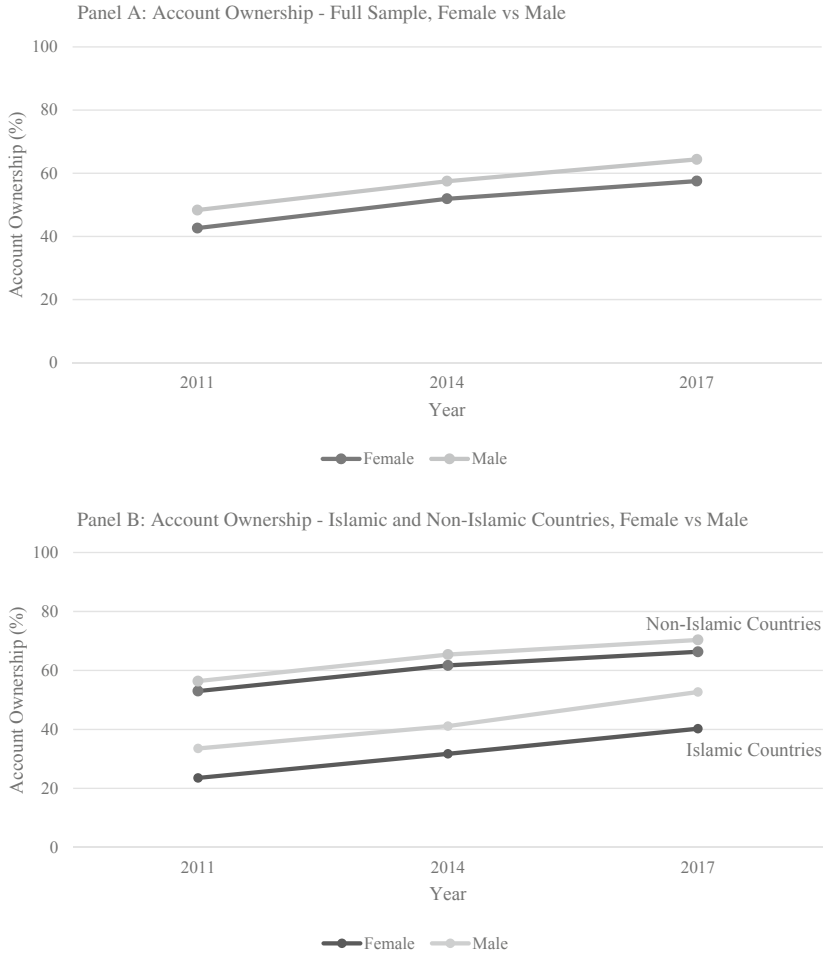

Fig. 10.1 Gender gap in account ownership (adults with an account, per cent): Islamic vs non-Islamic countries (*Note* This figure illustrates the trends in account ownership by gender for the full sample [Panel A] and for Islamic vs non-Islamic countries [Panel B] in year 2011, 2014, and 2017. *Source* Adapted from Global Findex Database 2017 and authors' calculations)

Table 10.4 Correlation matrix

Variables	*Account ownership*	*Account ownership (F)*	*Account ownership (M)*	*GDP per capita (log)*	*Inflation*	*Human development index*	*Gender inequality*	*Non-discrimination*
Account ownership	1.000							
Account ownership (F)	0.992***	1.000						
Account ownership (M)	0.992***	0.968***	1.000					
GDP per capita (log)	0.830***	0.820***	0.824***	1.000				
Inflation	–0.293***	–0.296***	–0.286***	–0.336***	1.000			
Human development index	0.843***	0.836***	0.835***	0.940***	–0.302***	1.000		
Gender inequality	–0.734***	–0.744***	–0.713***	–0.747***	0.282***	–0.798***	1.000	
Non-discrimination	0.174***	0.197***	0.150***	0.208***	–0.154***	0.238***	–0.278***	1.000
Regulation	0.540***	0.545***	0.523***	0.531***	–0.410***	0.527***	–0.538***	0.152***
Government integrity	0.747***	0.746***	0.734***	0.763***	–0.357***	0.705***	–0.639***	0.174***
(Lack of) corruption	0.568***	0.568***	0.558***	0.536***	–0.348***	0.523***	–0.487***	0.120***
Market concentration (CR5)	0.000	0.019	–0.021	–0.008	–0.054*	–0.076**	0.025	0.050
Market power index (Lerner)	–0.043	–0.079	–0.012	0.039	–0.036	–0.031	0.130**	–0.274***
(Lack of) competition (Boone)	–0.014	–0.044	0.019	–0.013	–0.011	0.035	0.048	–0.210***
Individuals using the internet (per cent)	0.820***	0.812***	0.812***	0.891***	–0.335***	0.911***	–0.784***	0.245***
Mobile subscriptions (ml)	0.046	0.030	0.063**	–0.036	0.027	0.027	0.039	–0.015

(continued)

Table 10.4 (continued)

Variables	*Regulation*	*Government integrity*	*(Lack of) corruption*	*Market concentration (CR5)*	*Market power index (Lerner)*	*(Lack of) competition (Boone)*	*Individuals using the internet (per cent)*	*Mobile subscriptions (ml)*
Account ownership								
Account ownership (F)								
Account ownership (M)								
GDP per capita (log)								
Inflation								
Human development index								
Gender inequality								
Non-discrimination								
Regulation	1.000							
Government integrity	0.628***	1.000						
(Lack of) corruption	0.405***	0.671***	1.000					
Market concentration (CR5)	0.105***	0.182***	0.104**	1.000				
Market power index (Lerner)	0.084*	0.024	0.027	0.111**	1.000			
(Lack of) competition (Boone)	–0.203***	–0.044	–0.017	–0.182***	0.127**	1.000		
Individuals using the internet (per cent)	0.544***	0.736***	0.601***	–0.020	–0.062	–0.040	1.000	
Mobile subscriptions (ml)	–0.099***	–0.025	–0.018	–0.290***	–0.038	–0.006	–0.059*	1.000

Note The table reports correlation coefficients for the variables used in the study. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. See Table 10.2 for variable definitions and data sources

Table 10.5 Islamic and non-Islamic countries: Differences in means

	Islamic countries		*Non-Islamic countries*		*Difference in means*	t-*Statistic*
	Obs	*Mean*	*Obs*	*Mean*		
Financial inclusion						
Account ownership	336	34.44	655	60.45	–26.01***	–13.54
Account ownership (F)	336	29.25	655	58.70	–29.45***	–15.12
Account ownership (M)	336	39.33	655	62.30	–22.96***	–12.01
Macro-economic factors						
GDP per capita (log)	333	8.00	651	8.98	–0.98***	–8.45
Inflation	312	5.13	640	5.32	–0.19	–0.22
Social factors						
Human development index	319	0.63	638	0.75	–0.12***	–11.88
Gender inequality	295	0.44	589	0.31	0.13***	10.71
Non-discrimination	316	0.62	646	0.85	–0.22***	–8.09
Institutional factors						
Regulation	290	6.68	616	7.15	–0.46***	–6.47
Government integrity	323	31.39	638	46.80	–15.40***	–11.44
(Lack of) corruption	207	27.38	421	40.76	–13.37***	–6.81
Banking market conditions						
Market concentration (CR5)	301	62.83	620	63.23	–0.39	–0.29
Market power index (Lerner)	125	0.32	261	0.30	0.02	1.54
(Lack of) competition (Boone)	191	2.41	346	–0.60	3.01***	3.80
Technological factors						
Individuals using internet (per cent)	336	34.54	648	51.53	–16.98***	–9.06

(continued)

Table 10.5 (continued)

	Islamic countries		*Non-Islamic countries*		*Difference in means*	t-*Statistic*
	Obs	*Mean*	*Obs*	*Mean*		
Mobile subscriptions (ml)	336	12.75	648	42.61	–27.35***	–2.46

Note The table presents the mean value and number of observations for the variables used in the study for the sub-samples of Islamic and non-Islamic countries, the difference in means calculated as the difference between Islamic countries and non-Islamic countries, and the *t*-statistics for the difference in means. Data covers the period from 2011 to 2017. *, **, *** indicate significance at 10 per cent, 5 per cent, and 1 per cent levels, respectively. See Table 10.2 for variable definitions and data sources

aspect, they appear to be lagging in promoting human development, achieving gender equality, and mandating non-discrimination against women in employment. Similarly, the indicators of institutional environment including regulation, government integrity, and lack of corruption show significantly lower values in Islamic countries. Among the banking factors, competition appears to be significantly lower in Islamic countries whereas concentration and market power do not show significant differences across the two groups of countries. With respect to technology, we find significantly lower internet usage and mobile subscriptions in Islamic countries. This is despite the considerable advances seen in many Islamic countries, such as the introduction and rapid adoption of M-Pesa accounts in Kenya (Jack & Suri, 2011; Mbiti & Weil, 2015).

While the observed differences in country characteristics might be driving the overall gender gap in financial inclusion between Islamic and non-Islamic countries, further analysis is needed to infer causality; however, this is beyond the scope of this chapter.

Concluding Remarks

This chapter offers an overview of the recent developments in the literature on the factors affecting financial inclusion and focuses on the differences across Islamic and non-Islamic countries and the issue of the gender gap. We use the World Bank's Global Findex database to provide an analysis of the patterns of financial inclusion, proxied by account ownership, among 56 Islamic and 101 non-Islamic countries during the period 2011 to 2017. We also explore possible determinants of financial inclusion across five dimensions covering the strength of the economy, social and institutional factors, as well as banking market conditions and technology.

Our exploratory analysis provides several interesting insights. First, financial inclusion is still relatively low in our sample, but it is particularly challenging in Islamic countries and for women. Our study suggests that among the key potential determinants of financial exclusion in Islamic versus non-Islamic countries are social factors (low human development, gender inequality, and discrimination against women in employment), institutional environment (weak regulation, low government integrity, and corruption), and technology (low usage of internet and mobile phone services).

As discussed in this chapter, financial inclusion has been identified as a key enabler of several Sustainable Development Goals such as ending poverty and achieving gender equality. However, although it has improved over recent years, there are still sizeable gaps across groups of countries and gender. To improve access, usage, and quality of financial services, particularly in less developed regions of the world, policy responses should target digital infrastructures as well as individual training, not only in terms of basic financial knowledge but also digital skills. Specifically in Islamic regions, more training opportunities in sharia-compliant financial instruments could encourage self-excluded individuals to access and use financial services. Future research could investigate in more detail the role of financial technology (fintech) in enhancing financial inclusion and lowering the gender gap in different macro-regions.

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Correction to: Collaboration or Community? The Impact of the Institutional Forces in Promoting Social Crowdfunding

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The original version of Chapter 9 was inadvertently published with chapter authors' first name and surname inverted incorrectly as "Minguzzi Antonio" instead of "Antonio Minguzzi", "Modina Michele" instead of "Michele Modina", "Filomeni Stefano" instead of "Stefano Filomeni", and "Bredice Marilena" instead of "Marilena Bredice", which have now been corrected. The chapter has been updated with the changes.

The updated original version of this chapter can be found at https://doi.org/10.1007/978-3-031-22539-0_9

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